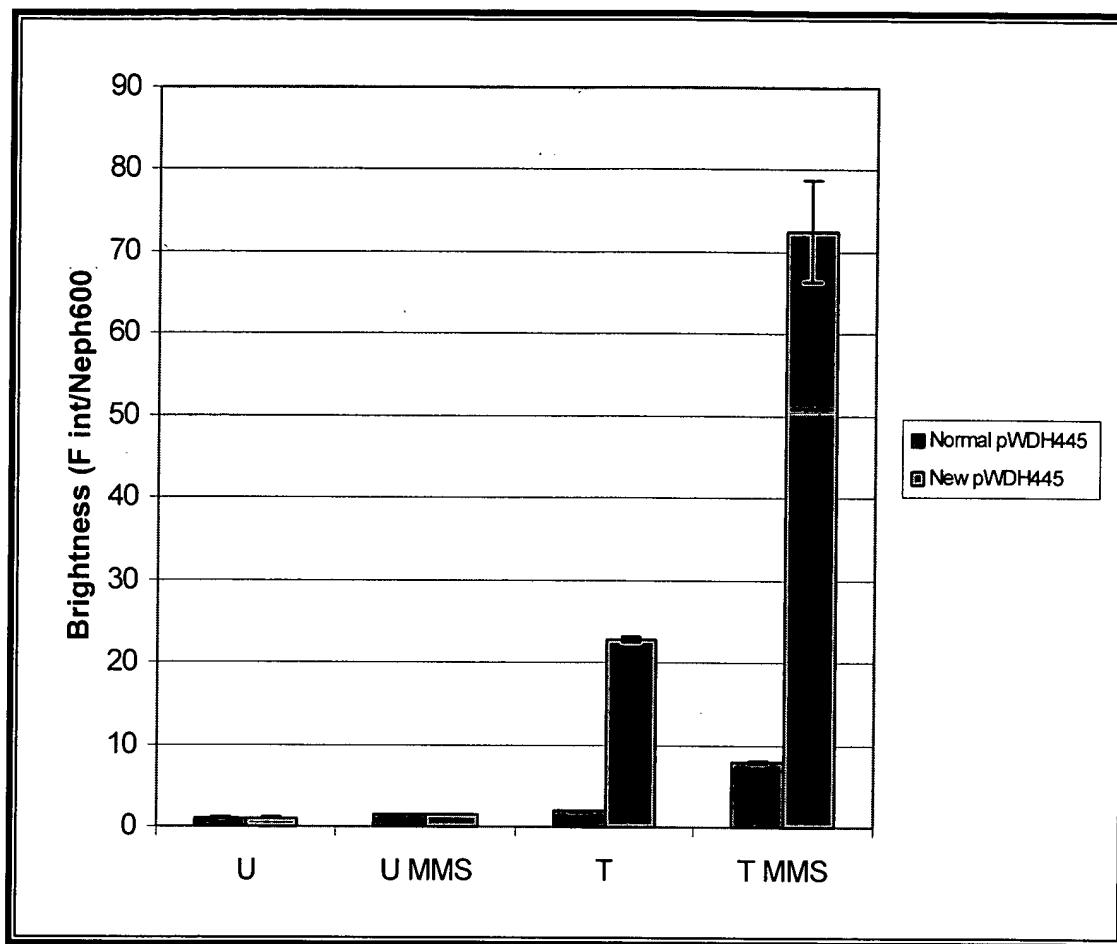


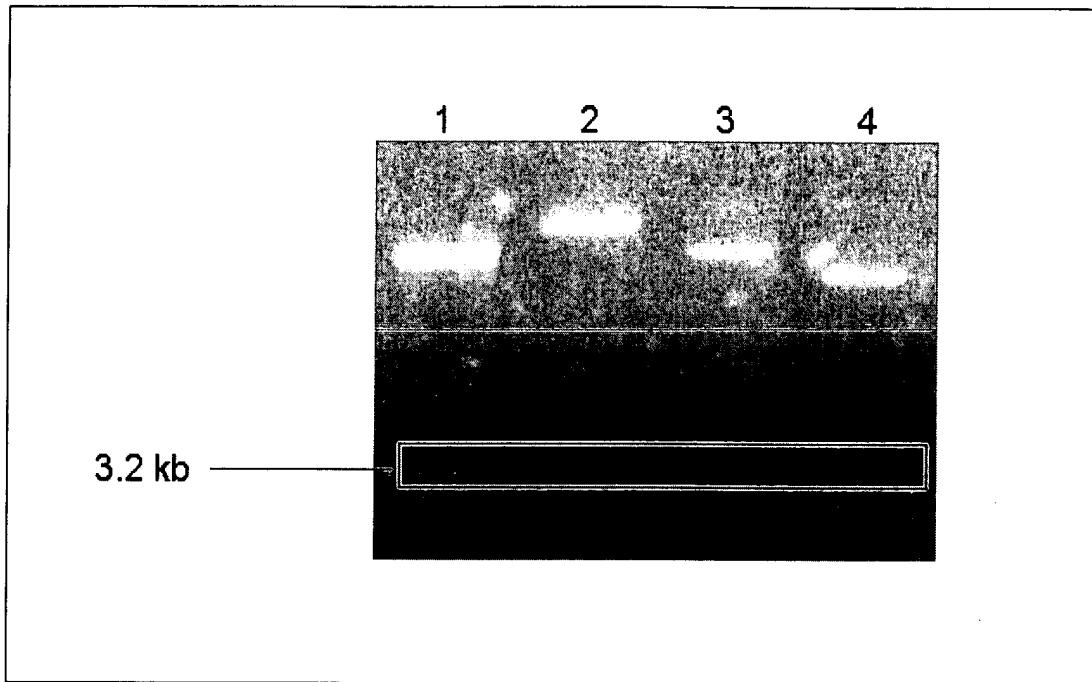
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FIG. 1



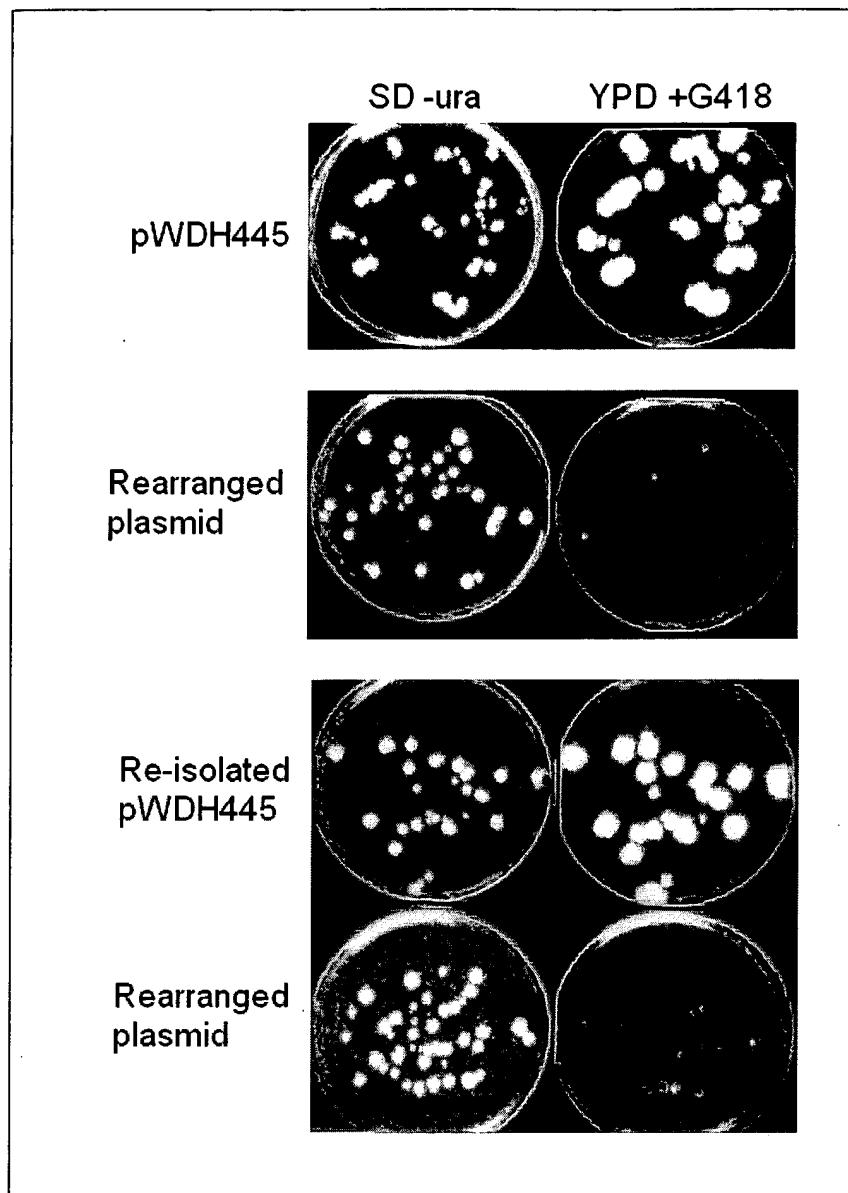
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FIG.2



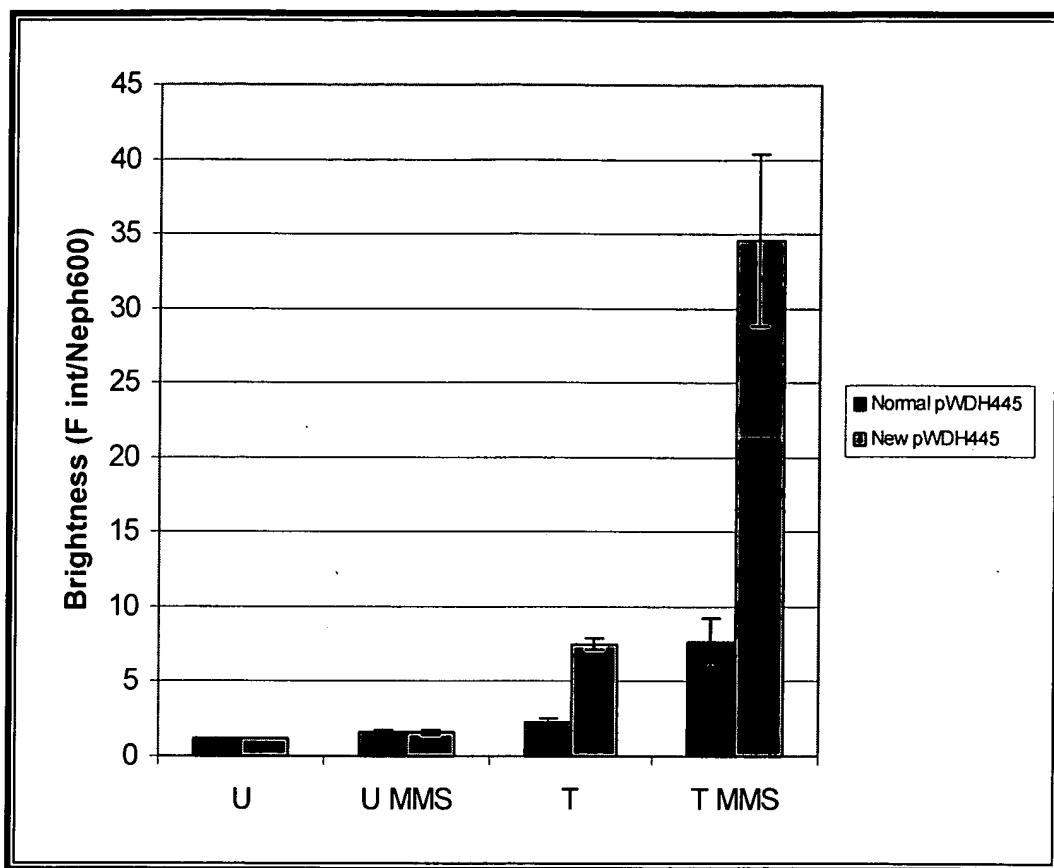
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FIG. 3



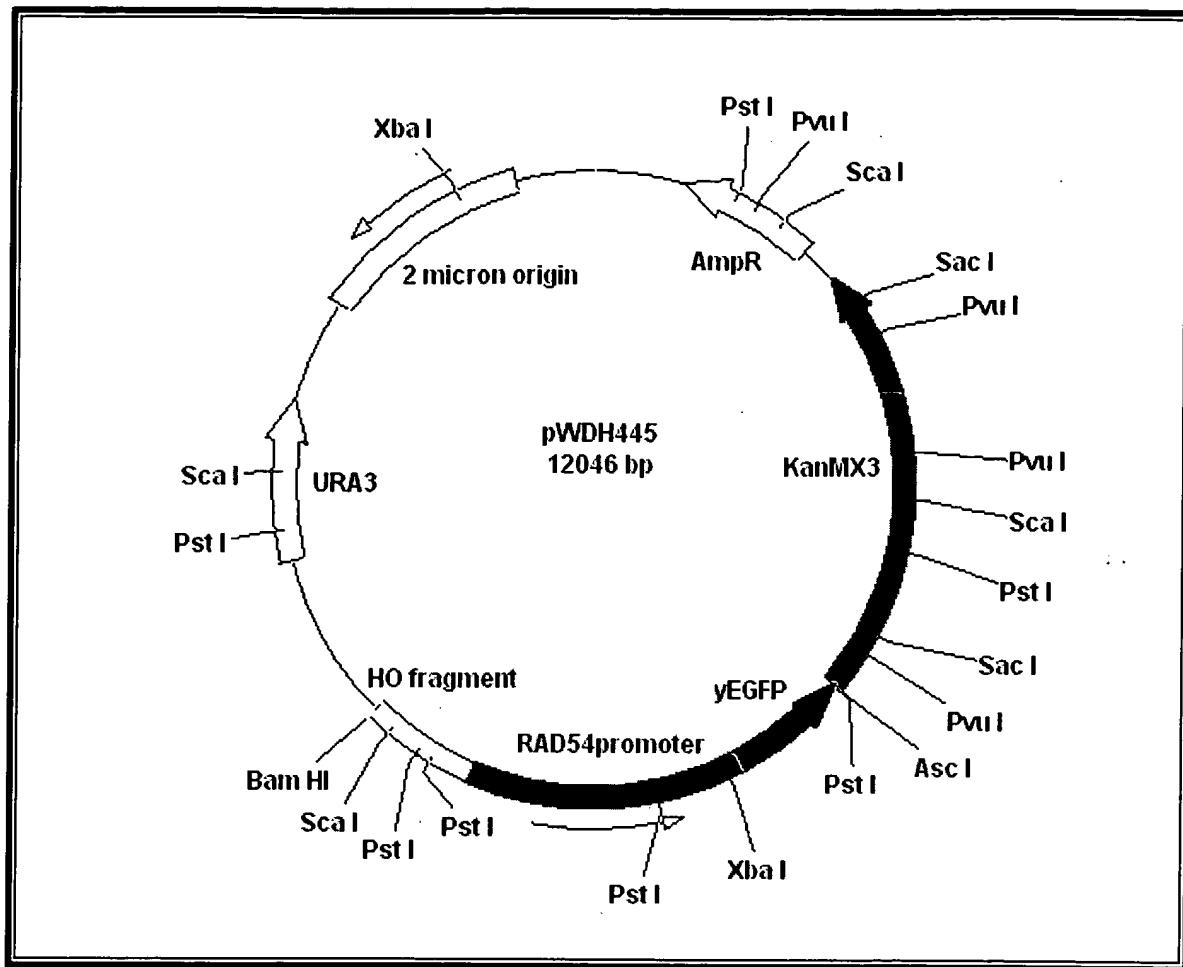
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FIG. 4



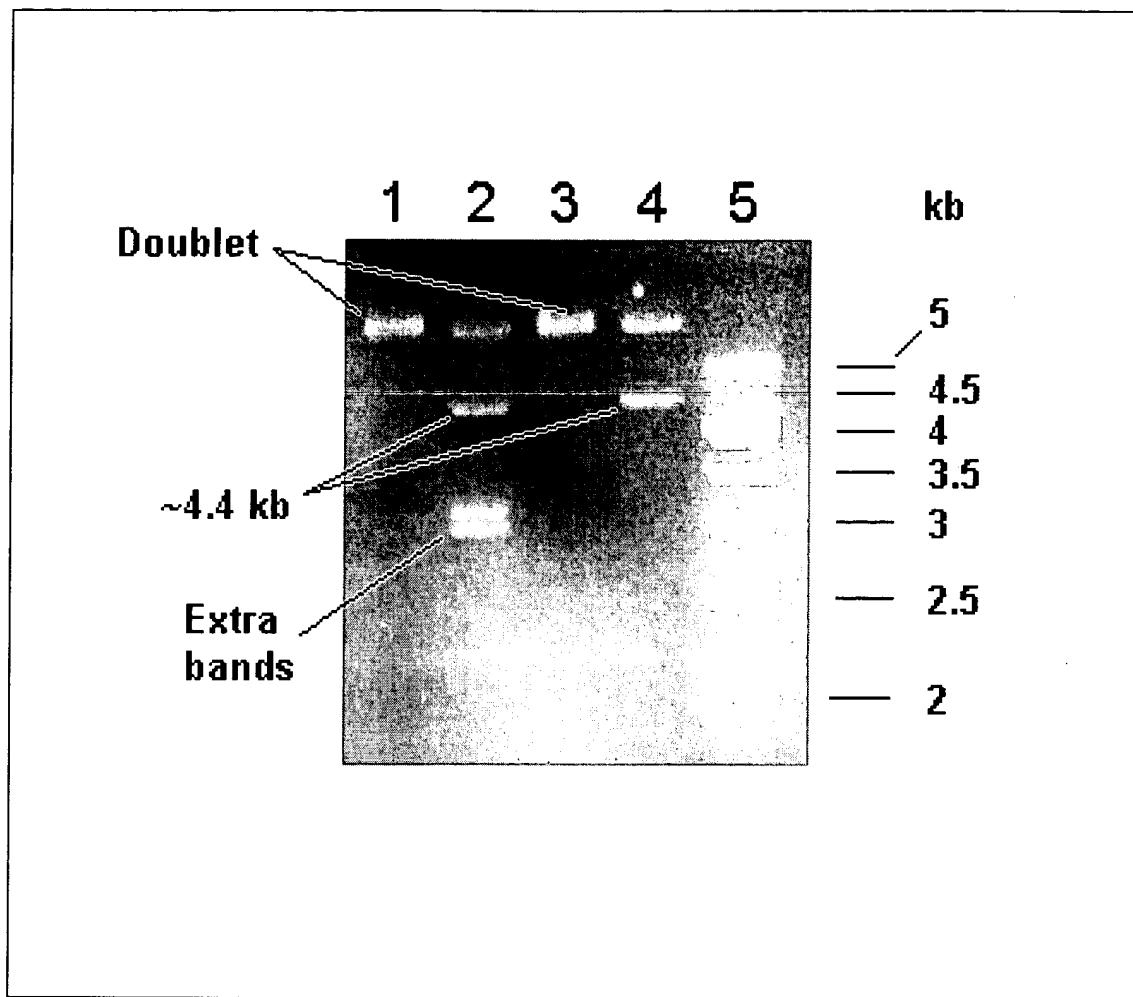
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FIG. 5



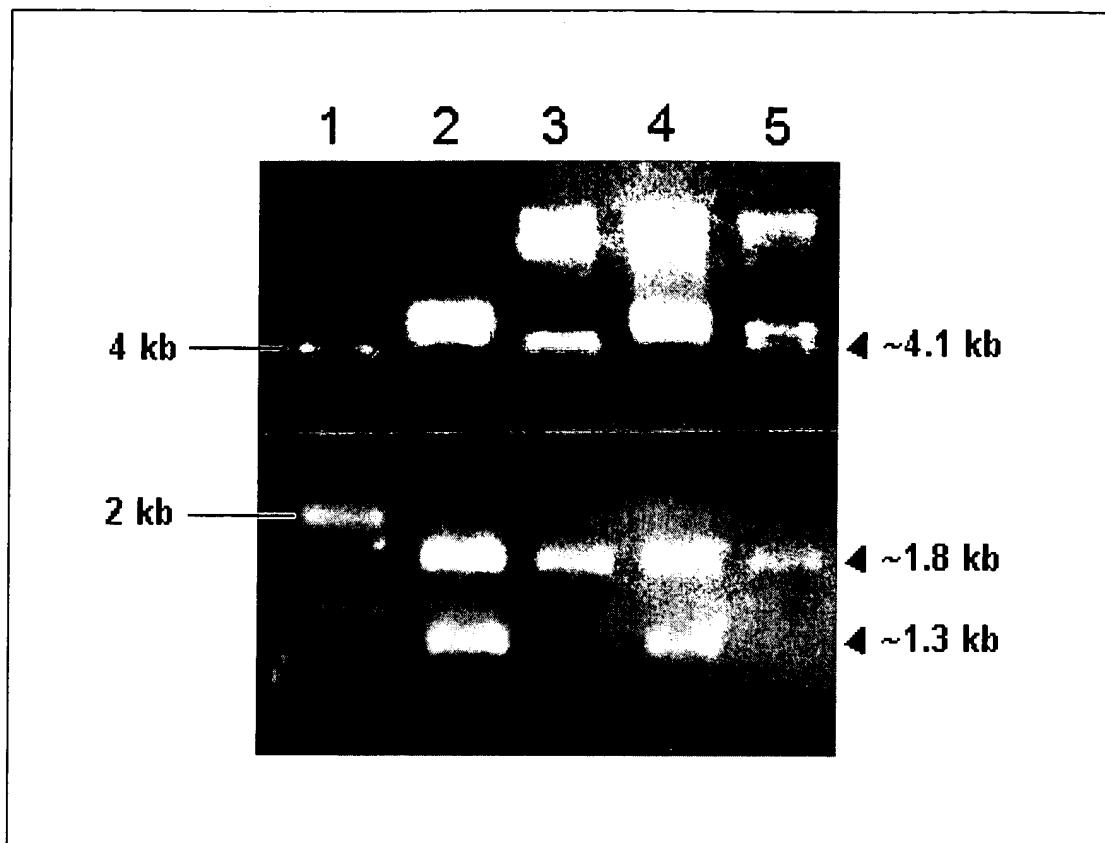
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FIG. 6



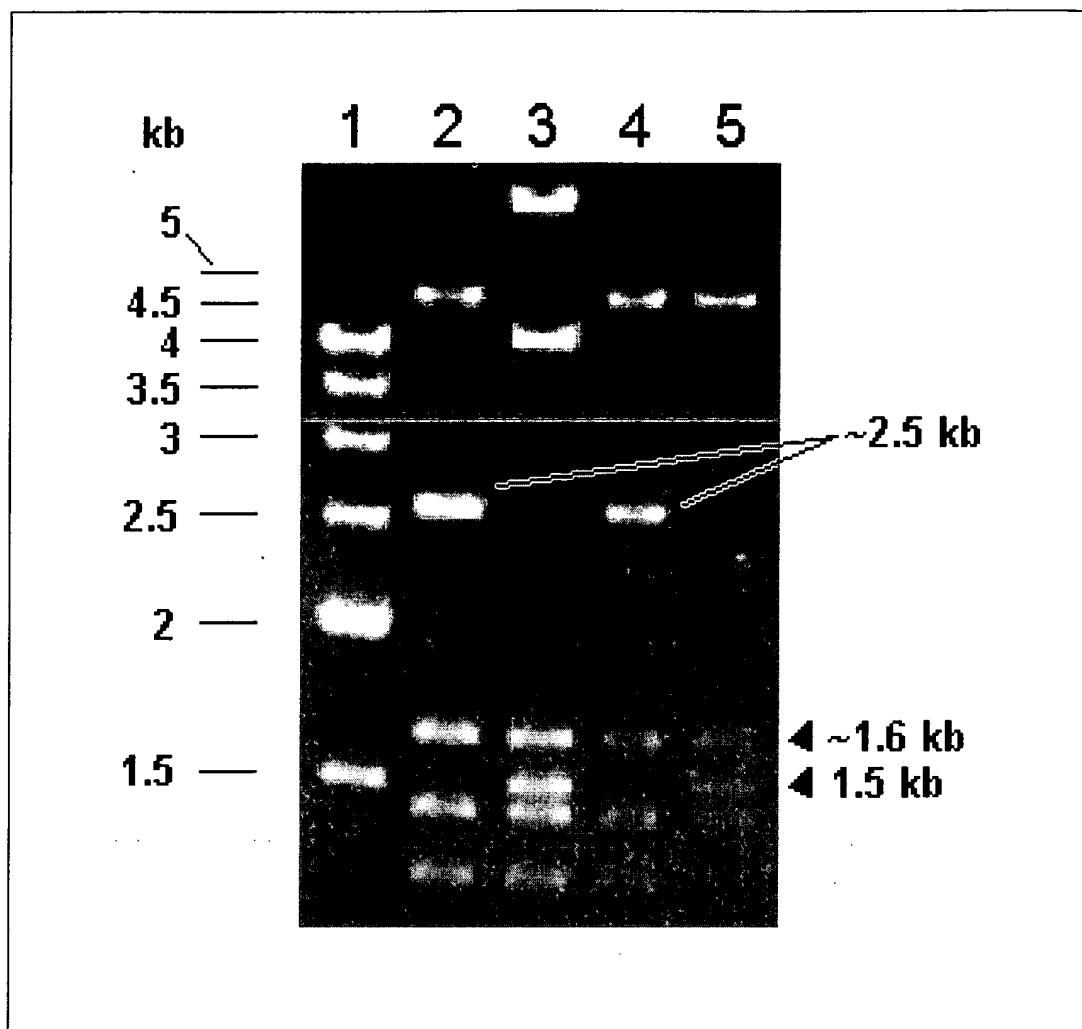
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FIG. 7



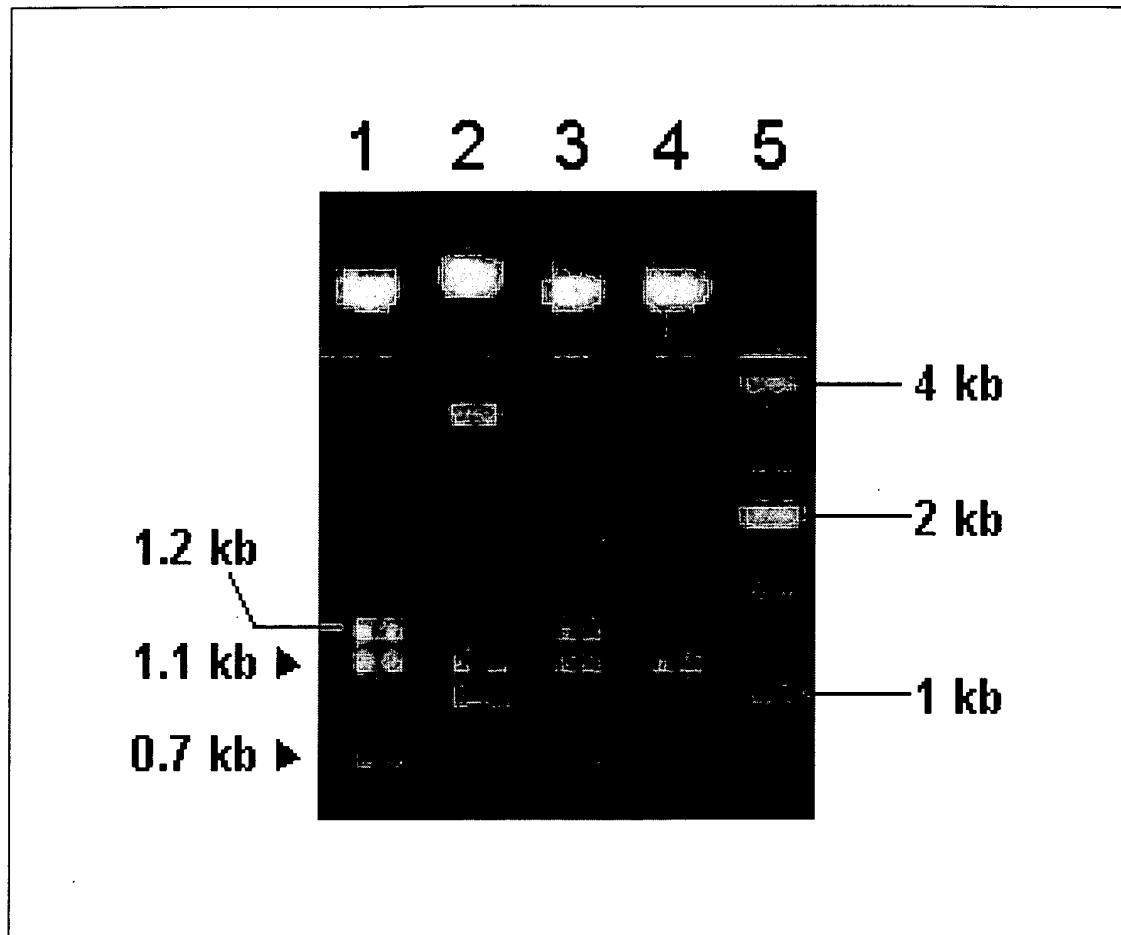
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FIG. 8



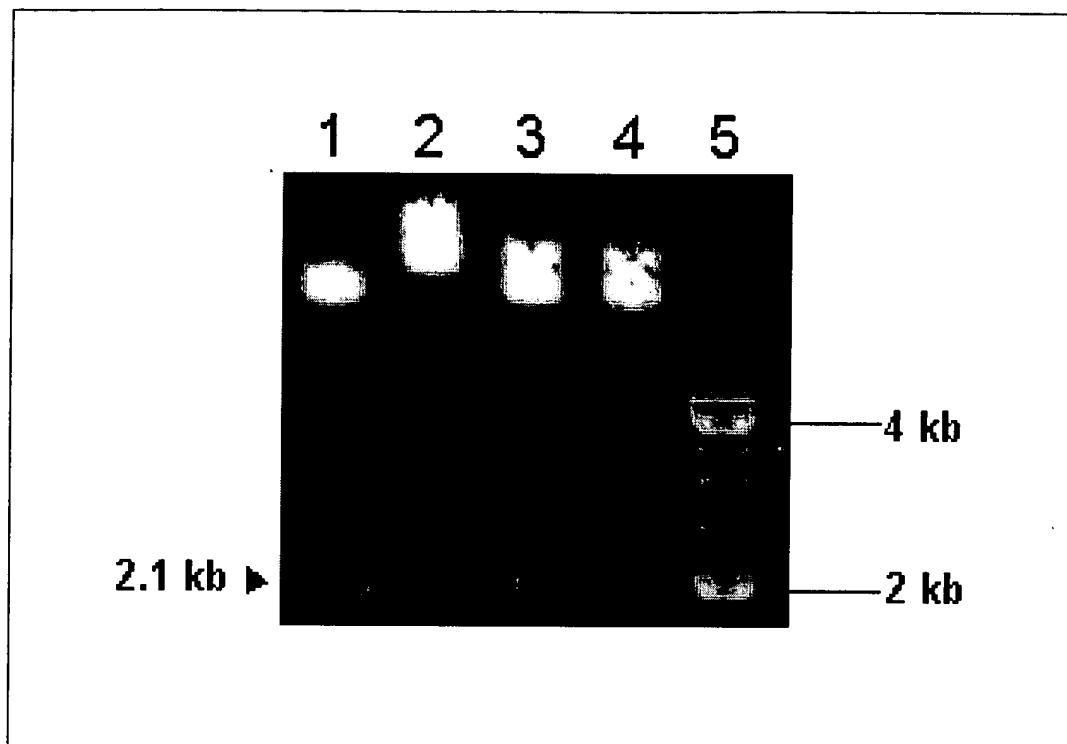
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FIG.9



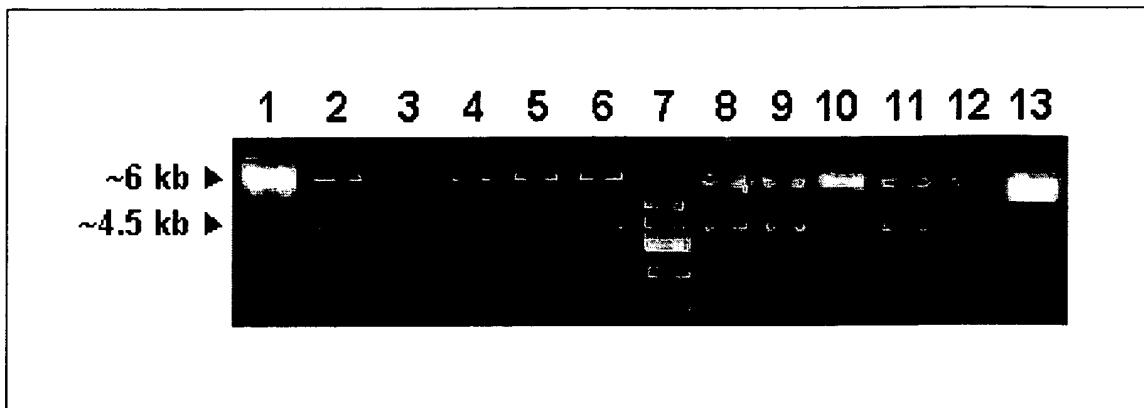
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FIG. 10



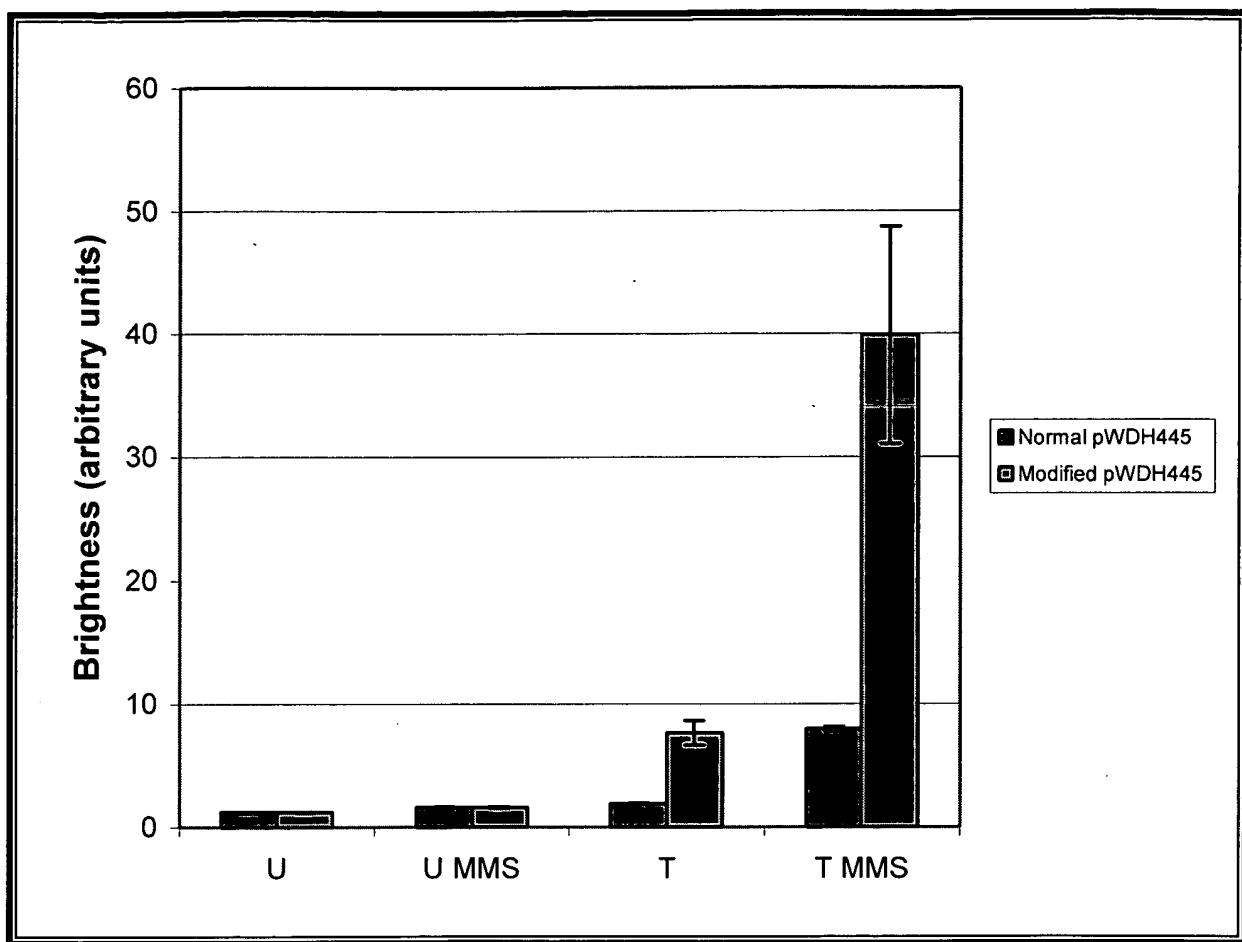
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FIG. 11



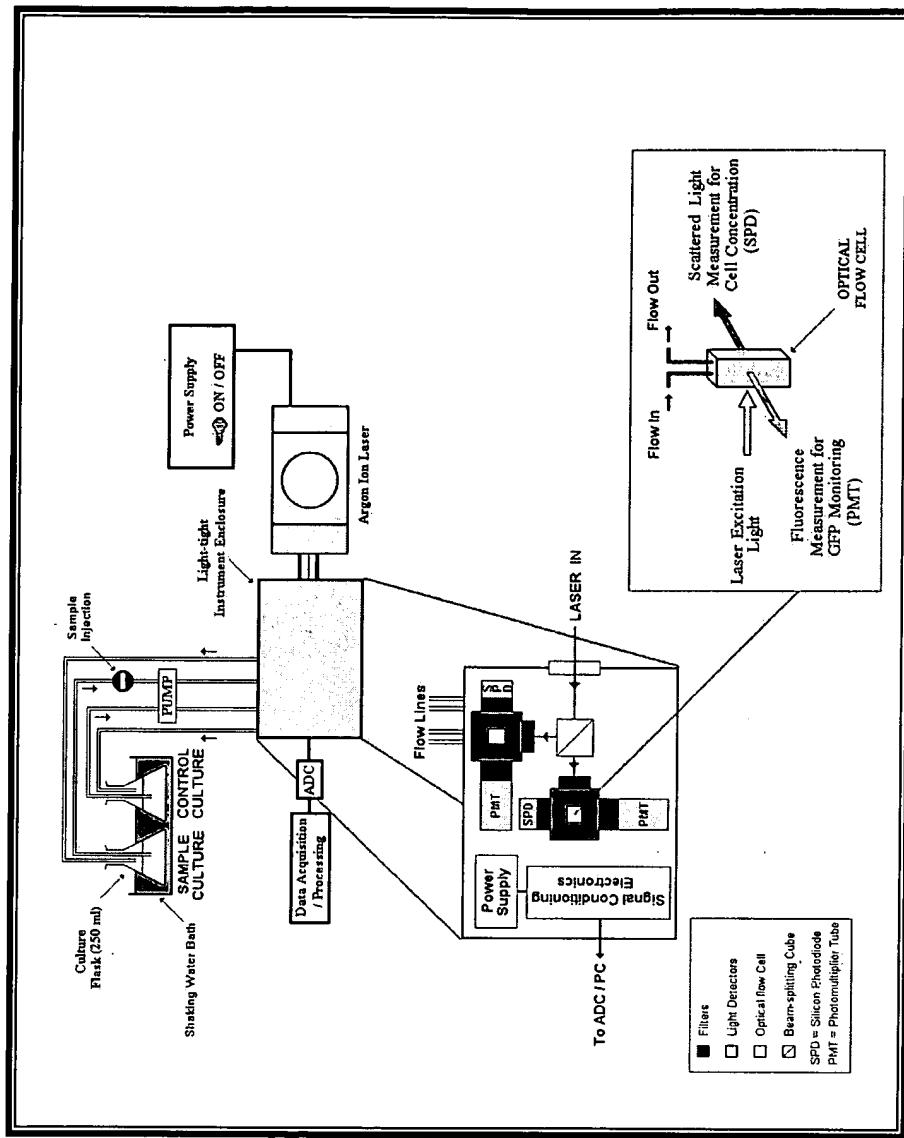
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FIG. 12



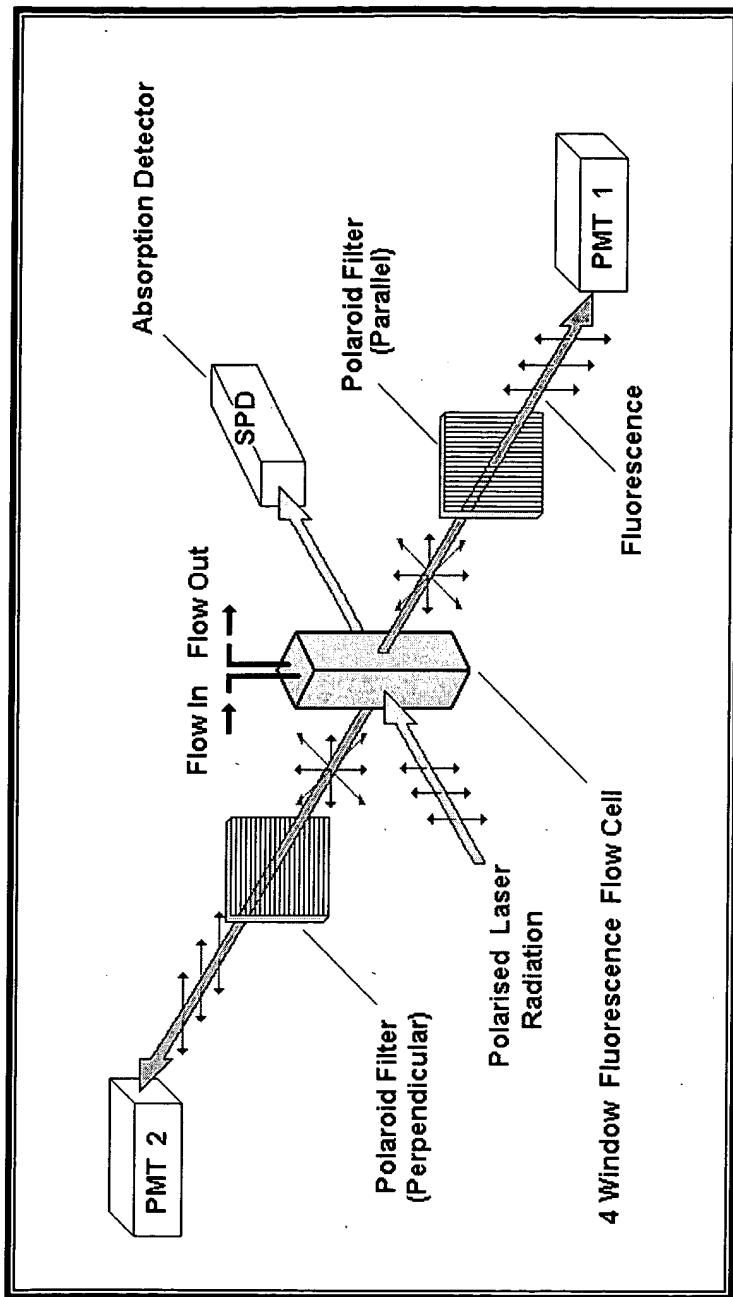
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FIG. 13



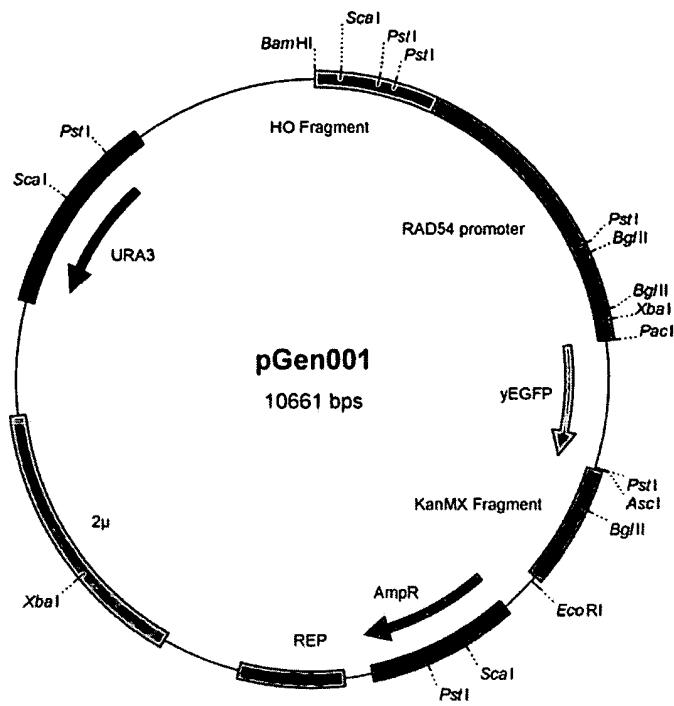
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FIG. 14



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FIG. 15



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FIG. 16

Key:

*HO sequence RAD54 Promoter yEGFP KanMX sequence AmpR REP 2μ sequence
URA3*

GATCCAAGCTATCTACTGAGATTTCTGGCTCTTGTGACTGTACCTAACCAAGCACATCCAA
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GATTTCTGATAGCCCTGTGTGACATTATGACGCCGGCAGCGGACATCTGCGCACATAACGTAAGAGT
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Figure 16 continued

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GATAAT
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ACCTTT**

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CTCCAGCGAAAGCGGTCCCTGCCGAAAATGACCCAGAGCGCTGCCGGCACCTGCTACGAGTTGCACTGAT

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CCGGCGTAGAG

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FIG. 17

1 GATCCAAGCT ATCTACTGAG ATTTCTGGCT CTTTTGTTGT ACTGTCACCT
51 AACCACAGAC CAAGCATCCA AGCCATACTT TTTACAGCAG GAGTTACAAG
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151 CTGGACCAA TCTTATGCAG CTAGAAATTC TCAATTGAGC ATCAAGATAA
201 TCCAAATCTC TAACTTCAT GTCAAAGTTG AAATATTCTC CTTTAGAGCG
251 CTCCATTCTC TCTATGAAGC GTTTGCGGC AAACTCACCT TCAACTGTCA
301 TTGGGAATGT CTTATGATGG TTTTTGGAA TTATTATTAT CCTACCATCA
351 AGCGTCTGAC ATTGCTGCAG ATTTCTCCAT CTCACCTTAT ATTTGGTGGC
401 ATTTCTACCA CTTTTTCCA ACAGTGGTTT GGTAGGGACC CTGACTGACA
451 ATTTATGACC TGCACTACAT TGTAATGCAA GACGCTGATA AACTGTTCTA
501 CGCCTGGGAT CTAACCTTAC AGGTTCACCT TCAAAAGCTC TGTGTTGGT
551 TTTTGCTGT ATATTATAGA TTTCTGATA GCCCTGTGTG ACATTATGA
601 CGCGGGCAGC GGAGCCATCT GCGCACATAA CGTAAGAGTT AGCCGTGACG
651 TTTGCGATGT CTTTAATTTC ACCGTTAGCC ATCAGAATAG TCGTGTTC
701 AGAAAGCATT TTGATCCGAC ATACGATGAC CTCATGATT TAGATTATGT
751 GTTGCACTTT TATAGACCTA CAAAAAATCC AGTGCCTACA CTAATACTTT
801 CATAAAGATA CCTGAAACAA TAACCAGAAA GATCGGCAAA AAAATTTTT
851 TTCTTGCCG AGATCACAAA CCTACTATGA CGAAAAAGCT TGAAGTTAG
901 ATGAGTAAGG AAAATACAAG TGACGCTTT ATATGGTGCAGGAAACAAA
951 ACTAAAAAAC ACAAGGCAAA TGTTGATCTG TCATGTATGG CAACGGACAGC
1001 AGGATGGCTC ACAAAAAAAG ACAAAAAAAA CTAAGGCAAA AGAACAAAGC
1051 TCCCTCTCTG CTCAGAACAC GTATTGTTGA AAAACCACCG TCGTAAGAAA
1101 GTTTTCTGT GACCTATAAT GTTTAAAAAT CGGCCATT TTTTCCCTC
1151 TTTTGTGGTC CAGTCTTCT CATACTCGAG GGAAATTCGA CACAAACAGC
1201 GGAGAAGTGT GGCTAAACCG GCAAGTGCCT GCAAGATCCA CAGAACTAAC
1251 CGCACGAACG GGCAGTCAGA AAAGAGCCTG TTCCGGAAAG AGAGAACAG
1301 AGAACCGATC ATGATGGAA AGCGGGGATT CGCGGAAGAA CGAGACTGGA
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1451 CGGTTCTGC CGCTCGTGGG AACCCACGC AAAACATATT ATTGCTTCT
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1801 CAAAGTAGCA TTTCTGTGCT AGCTATGTCT GTAGGTTAC ATTTAATGGT
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1951 CCTCTTAAGT AGAAAGCGTG AAATTGTTGC GTTCTGCT TACTACTCAA
2001 CGCGTACGCA AATGCGTCTA CTGCACCTGC ATGATAAAGC TTATGTATCA
2051 AAAATTTAAC ATCTTGAAAAA TACACAAGTG GTGCAAAGAT GTGTACGTT
2101 CTGGACCTGA GTGGTGCCT GTATGCTATT TAACATGCAA AGGGGAAGAC
2151 CCTTCCGCC TACTGCAATA ATAAAAAGTA TTTTACGGGT TACCCATAT
2201 AGCAAAGTT CGCGAAAAA AAAAATAAA AAACAATTAC AAACAAAAAG
2251 AAAAAGGAAATAGA AGATCTAAGT GAAGCGAAGG CAAAAACTCT
2301 TCTCACTTGAGT CGTAATAGCC GATACAAAAT CTAGAGCAGC AACTTTCTC
2351 TTTCTTCAGT AAAGCTGCTA CGAAAGTATA GAAAATCAA ACGCTCAGAA
2401 CTTAGCTCTA TTTCAAGGTA CCATATATAT TTCCCTTATAA CTGATGTTAA
2451 TTAACCTAA AGGTGAAGAA TTATTCACTG GTGTTGTCCC AATTTGGTT
2501 GAATTAGATG GTGATGTTAA TGGTCACAAA TTTCTGCTC CGGGTGAAGG

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Fig 17 continued

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2601 CTGGTAAATT GCCAGTTCCA TGGCCAACCT TAGTCACTAC TTTCGGTTAT
2651 GGTGTTCAAT GTTTGCGAG ATACCCAGAT CATATGAAAC AACATGACTT
2701 TTTCAAGTCT GCCATGCCAG AAGGTATGT TCAAGAAAGA ACTATTTTTT
2751 TCAAAGATGA CGGTAACATAC AAGACCAGAG CTGAAGTCAA GTTTGAAGGT
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3651 AGCTAGCCTC GAGGACCCCT CTCTTAGAC TATTCTACTC TTATGCACGT
3701 AAAAAAATTCT AGGAAATATG TATTAACTAG GAGTAAAATA ACCGGCTAGT
3751 GGCATTCTATA TAGCCGCTG TTTACATCTA CATCACACAT TTGAGTGT
3801 TATCTCGCA CGTGGCGTT AAATAGGCAG TCAATGGCC GACCATTCTA
3851 TGGTGTCTAG GTCGATGCCA TCTTGACG TTTAGCTTAT CGATGATAAG
3901 CTGTCAAACA TGAGAATTCT TGAAGACGAA AGGGCCTCGT GATACGCCA
3951 TTTTTATAGG TTAATGTCAT GATAATAATG GTTCTTCTAGA CGTCAGGTGG
4001 CACTTTTCGG GGAAATGTGC GCGAACCCCC TATTTGTTA TTTTTCTAAA
4051 TACATTCAAA TATGTATCCG CTCATGAGAC AATAACCTG ATAAATGCTT
4101 CAATAATATT GAAAAAGGAA GAGTATGAGT ATTCAACATT TCCGTGTCGC
4151 CCTTATTCCC TTTTTGCGG CATTTCGCT TCCGTGTTT GCTCACCCAG
4201 AAACGCTGGT GAAAGTAAAA GATGCTGAAG ATCAGTTGGG TGCACGAGTG
4251 GTTACATCG AACTGGATCT CAACAGCGGT AAGATCCTG AGAGTTTCG
4301 CCCCGAAGAA CGTTTCCAA TGATGAGCAC TTTTAAAGTT CTGCTATGT
4351 GCGCGGTATT ATCCCGTGT GACGCCGGC AAGAGCAACT CGGTGCCGC
4401 ATACACTATT CTCAGAATGA CTTGGTTGAG TACTCACCAAG TCACAGAAAA
4451 GCATCTTACG GATGGCATGA CAGTAAGAGA ATTATGCACT GCTGCCATAA
4501 CCATGAGTGA TAACACTGCG GCCAACCTAC TTCTGACAAC GATCGGAGGA
4551 CCGAAGGAGC TAACCGCTT TTTGCACAAC ATGGGGGATC ATGTAACTCG
4601 CCTTGATCGT TGGGAACCGG AGCTGAATGA AGCCATACCA AACGACGAGC
4651 GTGACACCAC GATGCCGCA GCAATGGCAA CAACGTTGCG CAAACTATTA
4701 ACTGGCGAAC TACTTACTCT AGCTTCCCGG CAACAATTAA TAGACTGGAT
4751 GGAGGCGGAT AAAGTTGCAG GACCACTTCT GCGCTCGGCC CTTCCGGCTG
4801 GCTGGTTTAT TGCTGATAAA TCTGGAGCCG GTGAGCGTGG GTCTCGCGT
4851 ATCATTGCAG CACTGGGGCC AGATGGTAAG CCCTCCCGTA TCGTAGTTAT
4901 CTACACGAGC GGGAGTCAGG CAACTATGGA TGAACGAAAT AGACAGATCG
4951 CTGAGATAGG TGCCTCACTG ATTAAGCATT GGTAACTGTC AGACCAAGTT
5001 TACTCATATA TACTTTAGAT TGATTTAAA CTTCATTTT AATTAAAAG
5051 GATCTAGGTG AAGATCCTT TTGATAATCT CATGACCAA ATCCCTTAAC
5101 GTGAGTTTC GTTCCACTGA GCGTCAGACC CCGTAGAAAA GATCAAAGGA
5151 TCTTCTTGAG ATCCTTTTT TCTGCGCGTA ATCTGCTGCT TGCAAACAAA
5201 AAAACCACCG CTACCAGCGG TGGTTTGTGTT GCCGGATCAA GAGCTACCAA

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Fig 17 continued

5251 CTCTTTTCC GAAGGTAACT GGCTTCAGCA GAGCGCAGAT ACCAAATACT
5301 GTCCTTCTAG TGTAGCCGA GTTAGGCCAC CACTTCAAGA ACTCTGTAGC
5351 ACCGCCTACA TACCTCGCTC TGCTAATCCT GTTACCAGTG GCTGCTGCCA
5401 GTGGCGATAA GTCGTGTCCT ACCGGGTTGG ACTCAAGACG ATAGTTACCG
5451 GATAAGGCGC AGCGGTCGGG CTGAACGGGG GGTCGTGCA CACAGCCCAG
5501 CTTGGAGCGA ACGACCTACA CCGAACTGAG ATACCTACAG CGTGAGCTAT
5551 GAGAAAGCGC CACGCTTCCC GAAGGGAGAA AGGCGGACAG GTATCCGGTA
5601 AGCGGCAGGG TCAGAACACGG AGAGCGCACG AGGGAGCTTC CAGGGGGAAA
5651 CGCTGGTAT CTTTATAGTC CTGTCGGGTT TCGCCACCTC TGACTTGAGC
5701 GTCGATTTTT GTGATGCTCG TCAGGGGGGC GGAGCCTATG GAAAAACGCC
5751 AGCAACGCGG CCTTTTACG GTTCTGGCC TTTTGCTGGC CTTTGTCTCA
5801 CATTTCTTT CTCGCTTAT CCCCTGATTG TGTGGATAAC CGTATTACCG
5851 CTTTGAGTC AGCTGATACC GCTCGCCGA GCGGAACCGAC CGAGCGCAGC
5901 GAGTCAGTGA GCGAGGAAGC GGAAGAGCGC CTGATGCGGT ATTTTCTCCT
5951 TACGCATCTG TGCGGTATTT CACACCGCAT ATGGTGCAC TCTCAGTACAA
6001 TCTGCTCTGA TGCCGCATAG TTAAGCCAGT ATACACTCCG CTATCGCTAC
6051 GTGACTGGGT CATGGCTGCCG CCCCCACACC CGCAACACCC CGCTGACGCG
6101 CCCTGACGGG CTTGTCGCT CCCCCGCATCC GCTTACAGAC AAGCTGTGAC
6151 CGTCTCCGGG AGCTGCATGT GTCAAGGGTT TTCACCGTCA TCACCGAAAC
6201 GCGCGAGGCA GAGCTTGAA GAAAAATGCC CTTTATTCAA TCTTGTCTAT
6251 AAAAAATGCC CCAAAATCTC ACATTGGAAG ACATTTGATG ACCTCATTTC
6301 TTTCAATGAA GGGCCTAACG GAGTTGACTA ATGTTGTGGG AAATTGGAGC
6351 GATAAGCGTG CTTCTGCCGT GGCCAGGACA ACGTATAACTC ATCAGATAAC
6401 AGCAATACCT GATCACTACT TCGCACTAGT TTCTCGGTAC TATGCATATG
6451 ATCCAATATC AAAGGAAATG ATAGCATTGA AGGATGAGAC TAATCCAATT
6501 GAGGAGTGGC AGCATATAGA ACAGCTAAAG GGTAGTGTG AAGGAAGCAT
6551 ACGATAACCC GCATGGAATG GGATAATATC ACAGGAGGTA CTAGACTACC
6601 TTTCATCCTA CATAAAATAGA CGCATATAAG TACGCATTAA AGCATAAAACA
6651 CGCACTATGC CGTTCTCTC ATGTATATAT ATATACAGGC AACACGCAGA
6701 TATAGGTGCG ACGTGAACAG TGAGCTGTAT GTGCGCAGCT CGCGTGTGCA
6751 TTTCGGAAGC GCTCGTTTC GGAAACGCTT TGAAGTTCT ATTCCGAAGT
6801 TCCTATTCTC TAGAAAGTAT AGGAACCTCA GAGCGCTTT GAAAACCAAA
6851 AGCGCTCTGA AGACGCACCT TCAAAAAAAC AAAAAACGCAC CGGACTGTAA
6901 CGAGCTACTA AAATATGCC AATACCGCTT CCACAAACAT TGCTCAAAG
6951 TATCTTTG CTATATATCT CTGTCGATA TCCCTATATA ACCTACCCAT
7001 CCACCTTTCG CTCCCTGAAC TTGCATCTAA ACTCGACCTC TACATTTTT
7051 ATGTTTATCT CTAGTATTAC TCTTTAGACA AAAAAATTGT AGTAAGAACT
7101 ATTCA TAGAG TGAATCGAAA ACAATACGAA AATGAAACCA TTTCTATAC
7151 GTAGTATATA GAGACAAAAT AGAAGAAACC GTTCATAATT TTCTGACCAA
7201 TGAAGAATCA TCAACGCTAT CACTTCTGT TCACAAAGTA TGCACATCC
7251 ACATCGGTAT AGAATATAAT CGGGGATGCC TTTATCTTGA AAAATGCAC
7301 CCGCAGCTTC GCTAGTAATC AGTAAACGCG GGAAGTGGAG TCAGGCTTT
7351 TTTATGGAAG AGAAAATAGA CACCAAAGTA GCCTTCTTCT AACCTTAACG
7401 GACCTACAGT GCAAAAAGTT ATCAAGAGAC TGCATTATAG AGCGCACAAA
7451 GGAGAAAAAA AGTAATCTAA GATGCTTTGT TAGAAAAATA GCGCTCTCGG
7501 GATGCATTTC TGTAGAACAA AAAAGAAGTA TAGATTCTT GTGGTAAAAA
7551 TAGCGCTCTC GCGTTGCATT TCTGTTCTGT AAAAATGCAG CTCAGATTCT
7601 TTGTTGAAA AATTAGCGCT CTCGCCTTGC ATTTTGTT TACAAAAATG
7651 AAGCACAGAT TCTTCGTTGG TAAAATAGCG CTTCGCGTT GCATTCTGT
7701 TCTGTAAAAA TGCAAGCTCAG ATTCTTTGTT TGAAAATTA GCGCTCTCGC
7751 GTTGCATTTT TGTTCTACAA AATGAAGCAC AGATGCTTCG TTCTGCGGTA
7801 AAGCTCATCA GCGTGGTCGT GAAGCGATTG ACAGATGTCT GCCTGTTCAT
7851 CCGCGTCCAG CTCGTTGAGT TTCTCCAGAA GCGTTAATGT CTGGCTTCTG
7901 ATAAAGCGGG CCATGTTAAG GGCGGTTTT TCCTGTTGG TCACTGATGC

Figure 17 continued

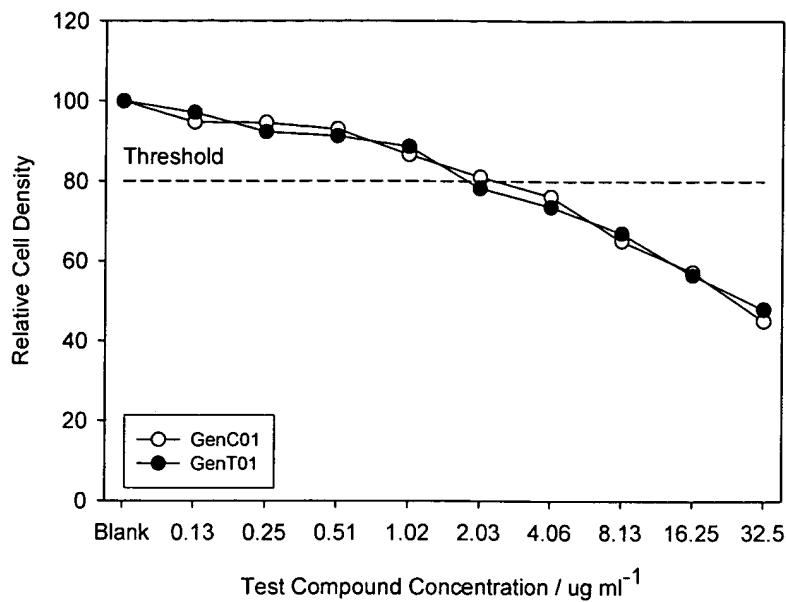
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7951 CTCCGTGTA GGGGGATTTC TGTTCATGGG GGTAATGATA CCGATGAAAC
8001 GAGAGAGGAT GCTCACGATA CGGGTTACTG ATGATGAACA TGCCCGGTTA
8051 CTGGAACGTT GTGAGGGTAA ACAACTGGCG GTATGGATGC GGCGGGACCA
8101 GAGAAAAATC ACTCAGGGTC AATGCCAGCG CTTCGTTAAT ACAGATGTAG
8151 GTGTTCCACA GGGTAGCCAG CAGCATCCTG CGATGCAGAT CCGGAACATA
8201 ATGGTGCAGG GCGCTGACTT CCGCGTTTCC AGACTTTACG AAACACGGAA
8251 ACCGAAGACC ATTCACTGTT TTGCTCAGGT CGCAGACGTT TTGCAGCAGC
8301 AGTCGCTTCAG CGTCGCTCG CGTATCGGTG ATTCAATTCTG CTAACCAGTA
8351 AGGCAACCCC GCCAGCCTAG CCGGGTCCCTC AACGACAGGA GCACCGATCAT
8401 GCGCACCCCGT GGCCAGGACC CAACGCTGCG GGGGGGGGGGGGGGGGGGG
8451 TCCAATTTT TTTTTTCGTT CATTATAGAA ATCATTACGA CCGAGATTCC
8501 CGGGTAATAA CTGATATAAT TAAATTGAAG CTCTAATTG TGAGTTTAGT
8551 ATACATGCAT TTACTTATAA TACAGTTTT TAGTTTGCT GGCCGCATCT
8601 TCTCAAATAT GCTTCCCAGC CTGCTTTCT GTAACGTTCA CCCTCTACCT
8651 TAGCATCCCT TCCCTTTGCA AATAGTCCTC TTCCAACAAT AATAATGTCA
8701 GATCCTGTTAG AGACCACATC ATCCACGGTT CTATACTGTT GACCCAATGC
8751 GTCTCCCTTG TCATCTAAC CCACACCGGG TGTCATAATC AACCAATCGT
8801 AACCTTCATC TCTTCCACCC ATGTCCTTT GAGCAAAAAA GCCGATAACA
8851 AAATCTTTGT CGCTCTTCGCA AATGTCAACA GTACCCCTAG TATATTCTCC
8901 AGTAGCTAGG GAGCCCTTGC ATGACAATTG TGCTAACATC AAAAGGCCTC
8951 TAGGTTCCCTT TGTTACTTCT TCCGCGCCCT GCTTCAAACC GCTAACAAATA
9001 CCTGGGCCCA CCACACCGTG TGCAATTGTA ATGTCCTGCC ATTCTGCTAT
9051 TCTGTATAACA CCCGCAGAGT ACTGCAATTG GACTGTATTA CCAATGTCAG
9101 CAAATTTCT GTCTTCGAG AGTAAAAAAAT TGTAATTGGC GGATAATGCC
9151 TTTAGCGGGCT TAACTGTGCC CTCCATGGAA AAATCAGTCA AGATATCCAC
9201 ATGTGTTTT AGTAAACAAA TTTGGGACC TAATGCTTCA ACTAACTCCA
9251 GTAAATTCTT GGTGGTACGA ACATCCAATG AAGCACACAA GTTTGTTTGC
9301 TTTTCGTCGA TGATATTAAA TAGCTTGGCA GCAACAGGAC TAGGATGAGT
9351 AGCAGCACGTT TCCTTATATG TAGCTTTCGA CATGATTAT CTTCGTTTCC
9401 TGCAGGTTTT TGTTCTGTG AGTGGGTTA AGAATACTGG GCAATTTCAT
9451 GTTCTCTCAA CACACATAT GCGTATATAT ACCAATCTAA GTCTGTGCTC
9501 CTTCTTCGTT CTTCTCTCT GCTCGGAGAT TACCGAATCA AAAAAAATTTC
9551 AAAGAAACCG GAATAAAAAA AAAGAACAAA AAAAAAAAAG ATGAATTGAA
9601 ACCCCCCCCCCC CCCCCGATGC GCGCGTGGCG GCTGCTGGAG ATGGCGGACG
9651 CGATGGATAT GTTCTGCCAA GGGTTGGTTT GCGCATTCAAGTTCCTCCGC
9701 AAGAATTGAT TGGCTCCAAT TCTTGGAGTG GTGAATCCGT TAGCGAGGTG
9751 CCGCCGGCTT CCATTCAAGGT CGAGGTGGCC CGGCTCCATG CACCCGGACG
9801 CAACCGGGGG AGGCAGACAA GGATAGGGC GGCGCCTACA ATCCATGCCA
9851 ACCCGTTCCA TGTGCTCGCC GAGGCAGCAT AAATCGCCGT GACGATCAGC
9901 GGTCCAGTGA TCGAAGTTAG GCTGGTAAGA GCGCGAGCG ATCCTGAAG
9951 CTGTCCTGAT TGGTCGTAT CTACCTGCCCT GGACAGCATG GCCTGCAACG
10001 CGGGCATCCC GATGCCGCCG GAAGCGAGAA GAATCATAAT GGGGAAGGCC
10051 ATCCAGCCTC GCGTCGCCGAA CGCCAGCAAG ACGTAGCCCA GCGCGTCGGC
10101 CGCCATGCCG GCGATAATGG CCTGCTTCTC GCGAAACGT TTGGTGGCGG
10151 GACCAAGTGCAGA GAAAGGCTTGA GCGAGGGCGT GCAAGATTCC GAATACCGCA
10201 AGCGACAGGC CGATCATCGT CGCGCTCCAG CGAAAGCGGT CCTCGCCGAA
10251 AATGACCCAG AGCGCTGCCG GCACCTGTCC TACGAGTTGC ATGATAAAGA
10301 AGACAGTCAT AAGTGCAGCG ACGATAGTCA TGCCCCGCGC CCACCCGAAG
10351 GAGCTGACTG GTGTTGAAGGC TCTCAAGGGC ATCGGTGAC GCTCTCCCTT
10401 ATGCGACTCC TGCATTAGGA AGCAGCCAG TAGTAGGTG AGGCCGTTGA
10451 GCACCGCCGC CGCAAGGAAT GGTGCATGCA AGGAGATGGC GCCCAACAGT
10501 CCCCCGGGCCA CGGGGCCCTGC CACCATACCC ACAGCGAAC AAGCGCTCAT
10551 GAGCCCGAAG TGGCGAGGCC GATCTTCCCC ATCGGTGATG TCGGGCGATAT
10601 AGGCGCCAGC AACCGCACCT GTGGCGCCGG TGATGCCGGC CACGATGCGT
10651 CGGGCGTAGA G

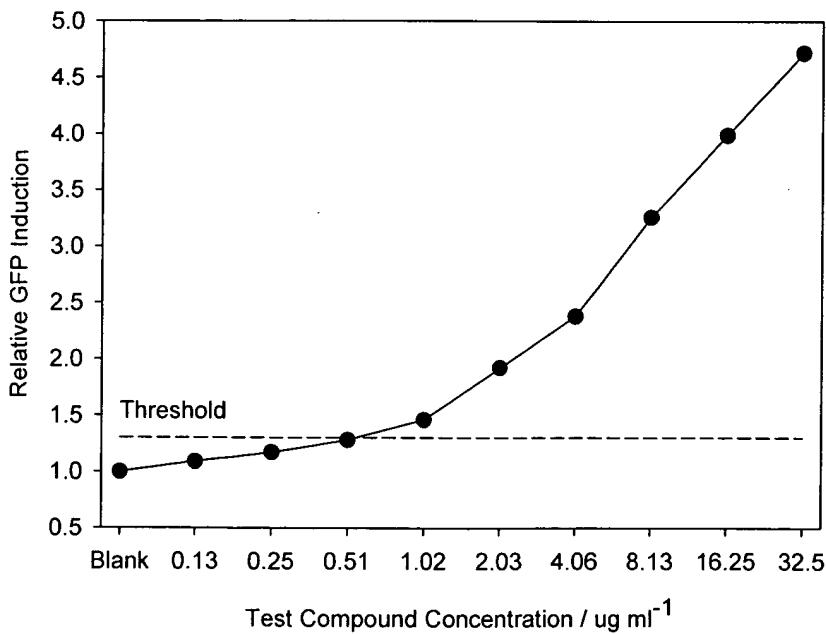
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FIG. 18

Cytotoxicity Profile:



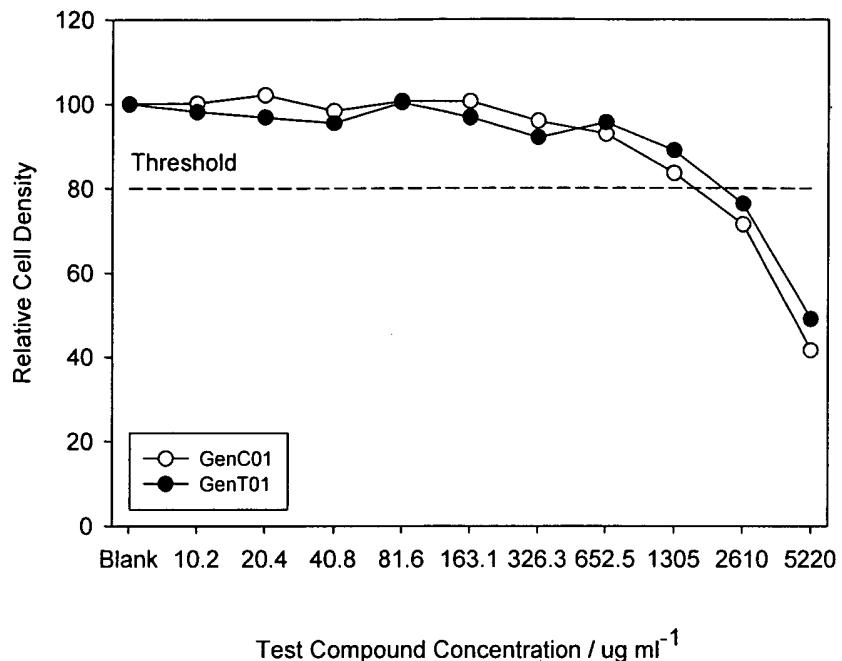
Genotoxicity Profile:



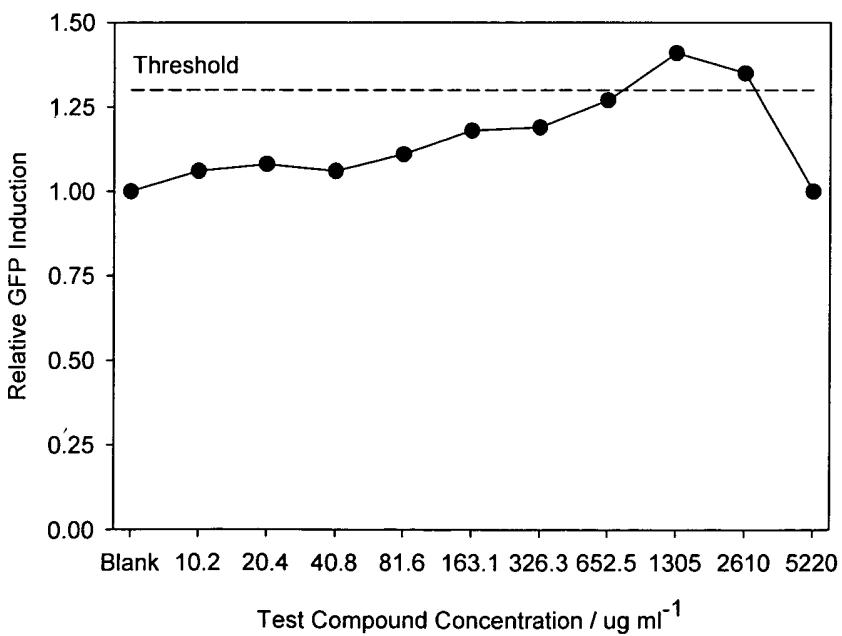
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FIG. 19

Cytotoxicity Profile:



Genotoxicity Profile:



GREEN SCREEN RESULTS

ALTERNATIVE TEST DATA

TEST COMPOUND	CAS No.	GenTo1 Strain		Test Range LEC / $\mu\text{g min}^{-1}$	Test Range mM	GenTo1 Strain Genotoxicity	Test Range LEC / $\mu\text{g m}^{-1}$	FP $\mu\text{g ml}^{-1}$	GenTo1 Strain Genotoxicity	Test Range LEC / $\mu\text{g m}^{-1}$	FP $\mu\text{g ml}^{-1}$	Ames Test	ML- Test	UmuC Test	NNT in vitro	NNT in vivo	RANT in vitro	RANT in vivo	Chrom Aliq
		Cytotoxicity	LEC / $\mu\text{g min}^{-1}$																
2-Acetylindoxole	65-95-3	++	26.8	115	0.52	-	115	0.52	-	115	0.52	+	+- (MA)	+	+ (MA)	+	+	+	
Acetilsalicylic Acid	50-70-2	-		867	4.01	-	867	4.01	-	867	4.01	+	-	-	-	-	-	+	
Acetophenone	60-76-0	+	82.5	500	0.10	-	500	0.10	-	500	0.10	+	-	-	-	-	-	+	
Acetoguanidine	59-77-9	+	56.3	112.5	0.50	-	112.5	0.50	-	112.5	0.50	-	-	-	-	-	-	+	
9-Aminocoumarin	80-45-9	++	8	128	0.55	-	128	0.55	-	128	0.55	-	-	-	-	-	-	+	
2-Aminanthracene	613-13-8	++	14.25	57	0.29	-	57	0.29	-	57	0.29	+	+- (MA)	+	+ (MA)	+	+	+ (p)	
2-Amino-4-phenol	99-57-0	++	19.25	77	0.50	++	9.6	77	0.50	104	1.02	+	+- (MA)	+	+ (MA)	+	+	+	
4-Aminophenol	123-30-4	-		504	4.62	-	504	4.62	-	504	4.62	-	-	-	-	-	-	+	
3-Amino-1,2,4-Triazole	61-02-5	+	910	640	9.99	+	810	8.61	9.99	840	9.89	+	-	-	-	-	-	-	
Amphetamine (Na salt)	69-52-3	-		9000	22.0	-	8000	22.9	-	8000	22.9	-	-	-	-	-	-	-	
Aniline	62-53-3	++	2653	20420	218.3	-	20420	218.3	-	20420	218.3	+	-	-	-	-	-	-	
o-Anisidine	80-04-0	++	14.2	437	3.65	-	437	3.65	-	437	3.55	+	+- (MA)	+	-	-	-	+	
Naphthalene	309-00-21-1	+	20	20	0.06	+	20	20	0.06	20	20	0.06	-	-	-	-	-	+	
NuC	147-91-4	-		1400	5.76	-	1400	5.76	-	1400	5.76	-	-	-	-	-	-	+	
5-Azacytidine	320-07-2	++	625	1250	5.12	++	325	1250	5.12	325	1250	5.12	+	+	+	+	+	+	
AZT	305-16-97-1	+	3876	7350	27.5	-	7350	27.5	-	7350	27.5	+	-	-	-	-	-	+	
Benzaldehyde	100-52-7	++	2825	5220	49.2	+	1313	5220	49.2	1313	5220	49.2	+	+- (MA)	+	+ (MA)	+	+	
Benzene (Benzene)	50-32-0	-		26	0.10	+	26	0.10	+	26	0.10	+	-	-	-	-	-	+	
Benzoyl Chloride	90-98-1	++	1615	12220	4.50	-	6622	4.50	-	304	12120	4.50	+	+- (MA)	+	+ (MA)	+	+	
Bleomycin Sulfoxide	90-93-4	++	6	6	0.0056	++	2.5	6	0.0035	2.5	6	0.0035	+	+	+	+	+	+	
Cadmium Chloride	10108-84-2	+	2	0	0.011	-	2	0.011	-	2	0.011	+	+-	+	+	+	+	+	
Caffeine	60-00-1	++	265	631	2.73	-	531	2.73	-	531	2.73	-	-	-	-	-	-	+	
Calcein	120-00-9	++	177	860	7.89	++	599	860	7.89	599	860	7.89	+	+-	+	+	+	+	
Caloxazine	64-05-93-1	++	238	238	0.50	++	238	238	0.50	238	238	0.50	-	-	-	-	-	-	
Chlorambucil	305-03-3	+	125	250	0.82	-	260	0.82	-	260	0.82	+	+-	+	+	+	+	+	
Chlorophenicol	56-76-7	+	182	182	0.60	++	10.1	182.0	0.50	10.1	182.0	0.50	0.0005	-	-	-	-	-	
Chromomycin A3	7059-24-7	-		10	0.0055	-	10	0.0055	-	10	0.0055	-	-	-	-	-	-	-	
Cinnoline	51-01-81-9	+	125	125	0.50	++	31.3	125	0.50	427	125	0.50	+	+-	+	+	+	+	
Caprolactam (without DMSO)	15683-27-1	++	2.34	150	0.50	+	1676	37.5	0.12	1676	37.5	0.12	+	+-	+	+	+	+	
Cochlearine	61-00-9	-		853	2.14	+	427	853	2.14	427	853	2.14	-	-	-	-	-	-	
Cumene Hydroperoxide	4170-30-3	++	265	1692	24.1	++	85.2	169	24.1	85.2	169	24.1	+	+	+	+	+	+	
Cyclohexanone	66-15-9	++	65.4	519	3.41	-	104	66.8	-	104	66.8	-	-	-	-	-	-	+	
Damnumulich	2334-15-0	++	0.5	250	0.44	++	0.25	1450	0.15	1450	0.15	0.15	0.0009	+	+	+	+	+	
3,5-Dichlorophenol	69-15-5	++	12.5	25	0.15	-	25	0.15	-	25	0.15	-	-	-	-	-	-	-	
Diisomy Peroxide	00-43-3	++	0.3	0.3	0.0011	-	0.3	0.0011	-	0.3	0.0011	-	-	-	-	-	-	+	
Dieldrin	60-57-1	-		19.8	39.6	0.10	-	39.6	0.10	110	0.54	-	-	-	-	-	-	+	
Disulfurine-4-methylcoumarin	91-44-1	++	59	118	0.51	-	118	0.51	-	118	0.51	-	-	-	-	-	-	+	
1,2-Diethylhydrazine HCl	305-37-6	++	330	1330	10.00	++	656	1330	10.00	656	1330	10.00	+	+	+	+	+	+	
Econazole Nitrate	21165-02-6	++	25	50	0.11	++	2.5	50	0.11	2.5	50	0.11	-	-	-	-	-	-	
Epsilonine	519-23-3	++	4.39	552	2.20	++	12.6	552	2.20	16740	232	0.10	0.0011	-	-	-	-	+	
1,2-Epoxyethane	106-00-7	+	8370	16740	4.62	+	16740	4.62	+	16740	4.62	+	+- (MA)	+	+ (MA)	+	+	+	
Ethidium Bromide	1239-45-8	-		12.5	0.032	++	6.25	12.5	0.032	32.3	12.5	0.032	+	+	+	+	+	+	
7-Ethoxocoumarin	31005-02-4	-		129	0.58	++	32.3	129	0.58	10420	10420	0.58	103.98	+	+	+	+	+	
Ethy Acrylate	140-98-5	++	4605	16420	184.0	-	16420	184.0	-	16420	184.0	-	-	-	-	-	-	+	
Ethy Methacrylate	107-15-3	-		224.0	450	7.18	-	450	7.18	-	450	7.18	-	-	-	-	-	+	

Fig.20 [2/3]

Thiourac	62-56-6	++	10050	20100	264	++	1256	5000	65.7	+	-	-	+/-
Thiobium Diotile	13163-67-7	-		179	2.24	-		178	2.24				-
Trichloroacetonitrile	54-50-2	++		203	0.20	++		28.8	0.20				-
Trichloro Phosphate	133-0-70-5	-	3.6		572	1.55	++	143	672	1.55			+/-
Uradane	51-70-6	++		10300	20500	231	++	10300	10300	115.60			-
Vanillin	121-35-5	++		21.25	170	1.12	-		152	1.00			+
Vinblastine	143-07-9	++		62.5	250	0.28	-		250	0.28			-
													+

KEY	-	Negative
	+	Positive
	++	Strong Positive
	+/-	Results vary between reports
	MA	Metabolic activation required to obtain positive result.
	LEG	Lowest effective concentration
	PP	Fluorescence polarisation used to reveal the result.
	(P)	Polyploid problems. Increase significantly

FIG.21

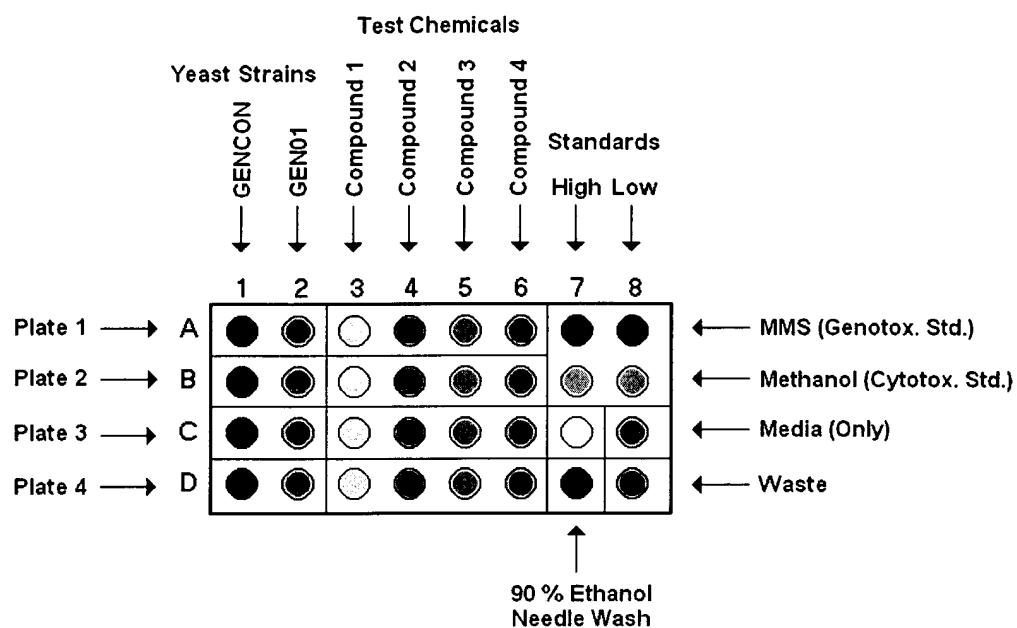
TEST COMPOUND	GSA	Ames	S9	TEST COMPOUND	GSA	Ames	S9
2-Amino-4-nitrophenol	++	+	+	2-Acetamidofluorene	-	+	+
Ethidium Bromide	++	+	+	2-Aminoanthracene	-	+	+
Neutral Red	++	+	+	o-Anisidine	-	+	+
Proflavin Hemisulfate	++	+	+	8-Hydroxyquinoline	-	+	+
5-Azacytidine	++	+	-	Isobutyl Nitrite	-	+	+
Bleomycin Sulfate	++	+	-	N-Nitrosodiphenylamine	-	+	+
Crotonaldehyde	++	+	-	9-Aminoacridine	-	+	-
Daunorubicin	++	+	-	Chlorambucil	-	+	-
Ellipticine	++	+	-	Cumene Hydroperoxide	-	+	-
Ethyl methanesulfonate	++	+	-	Hydroquinone	-	+	-
Furazolidone	++	+	-	ICR191 Acridine Mutagen	-	+	-
Hydrazine monohydrate	++	+	-	Nitrofurantoin	-	+	-
Hydroxyurea	++	+	-	N-Nitrosodimethylamine	-	+	-
Methyl methanesulfonate	++	+	-	4,4-Oxydianiline	-	+	-
MNNG	++	+	-	Quercetin	-	+	-
Nalidixic Acid	++	+	-	Sodium Selenite	-	+	-
4-Nitroquinoline-N-oxide	++	+	-	Acetylsalicylic Acid	-	-	-
N-Nitroso-N-ethyl urea	++	+	-	Actinomycin D	-	-	-
N-Nitroso-N-methyl urea	++	+	-	4-Aminophenol	-	-	-
Sodium Azide	++	+	-	Ampicillin (Na salt)	-	-	-
Streptonigrin	++	+	-	Aniline	-	-	-
Trichloroacetonitrile	++	+	-	AraC	-	-	-
Benzo(a)pyrene	+	+	+	AZT	-	-	-
1-Naphthylamine	+	+	+	Cadmium Chloride	-	-	-
Benzoyl Chloride	+	+	-	Caffeine	-	-	-
Cisplatin (without DMSO)	+	+	-	Chromomycin A3	-	-	-
1,2-Epoxybutane	+	+	-	Cycloheximide	-	-	-
Hexamethylenetetramine	+	+	-	3,5-Dichlorophenol	-	-	-
Hydrogen Peroxide	+	+	-	Dicumyl Peroxide	-	-	-
Mechlorethamine HCl	+	+	-	Dieldrin	-	-	-
Mitomycin C	+	+	-	Diethylamino-4-methylcoumarin	-	-	-
3-Amino-1,2,4-triazole	+	-	-	Ethyl Acrylate	-	-	-
Aphidicolin	+	-	-	Ethylenediamine	-	-	-
Benzaldehyde	+	-	-	Methyl Carbamate	-	-	-
Colchicine	+	-	-	Méthyl Methacrylate	-	-	-
Etoposide	+	-	-	Nicotine	-	-	-
Methyl viologen	+	-	-	Nitrobenzene	-	-	-
Psoralen	+	-	-	Phenol	-	-	-
Catechol	++	-	-	Sulfisoxazole	-	-	-
Chloramphenicol	++	-	-	Taxol	-	-	-
1,2-Dimethylhydrazine HCl	++	-	-	Tetracycline HCl	-	-	-
Econazole Nitrate	++	-	-	Titanium Dioxide	-	-	-
Methapyrilene HCl	++	-	-	Vanillin	-	-	-
Phthalic acid bis(2-ethylhexyl) ester	++	-	-	Vinblastine	-	-	-
Safrole	++	-	-	S9 column records requirement for Ames result			
Sulfamethoxazole	++	-	-	+ S9 required			
Thiourea	++	-	-	- S9 not required			
Tritoly Phosphate	++	-	-				
Urethane	++	-	-				

Table 3

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FIG. 22

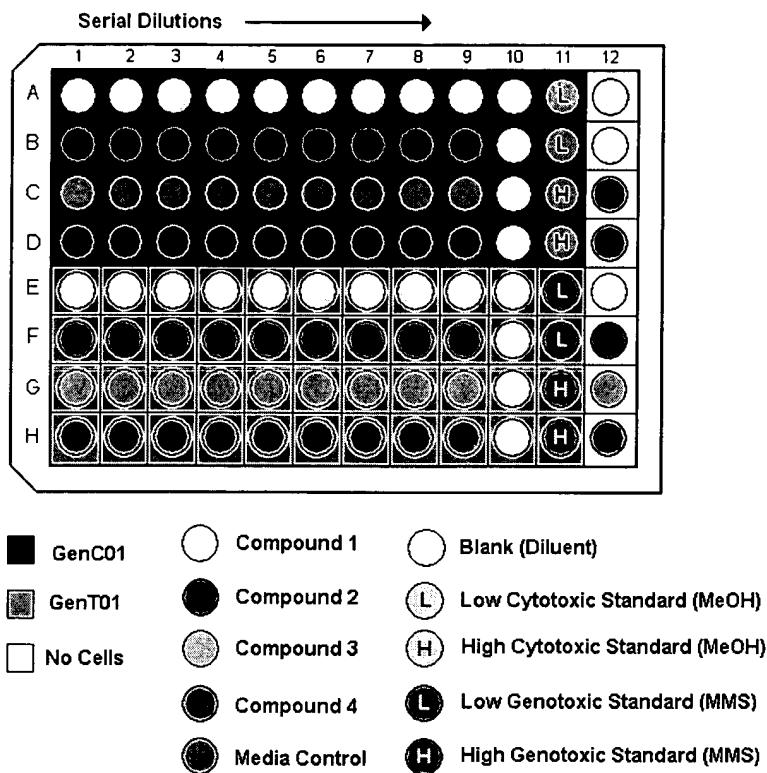
Greenrack loading sequence



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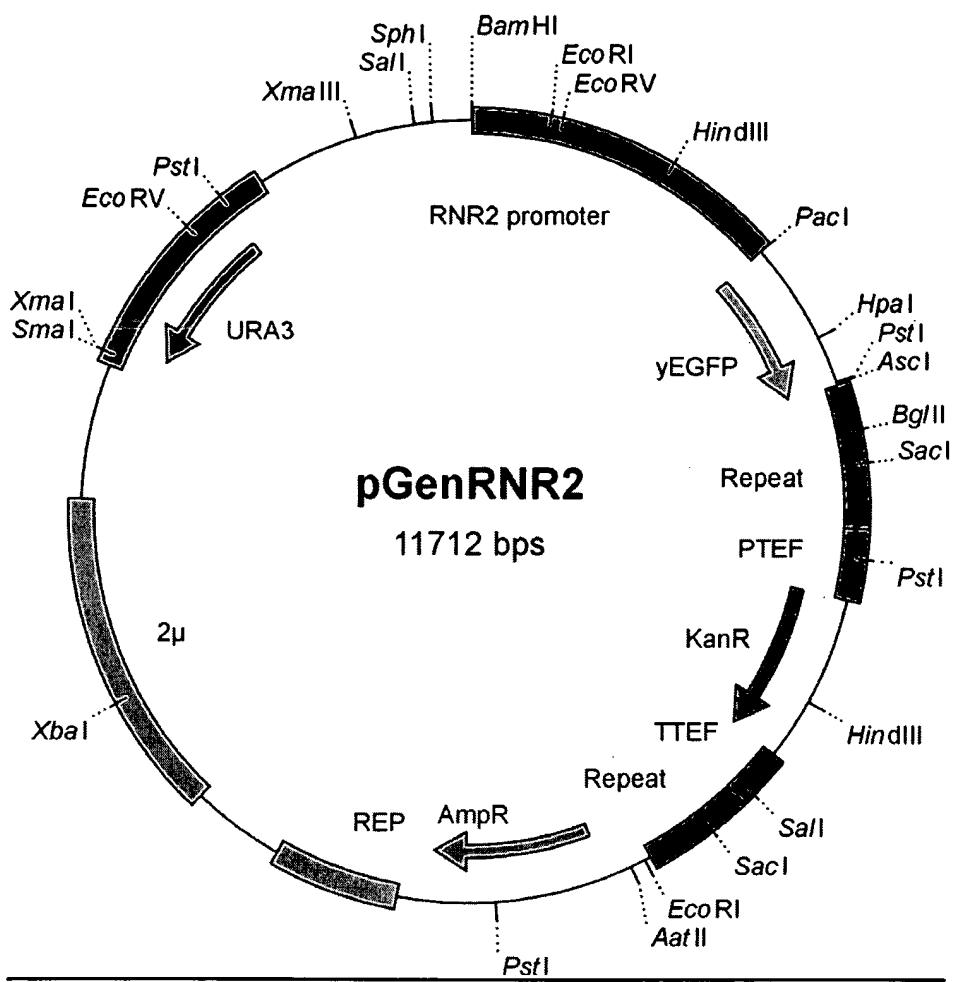
FIG. 23

Microplate layout



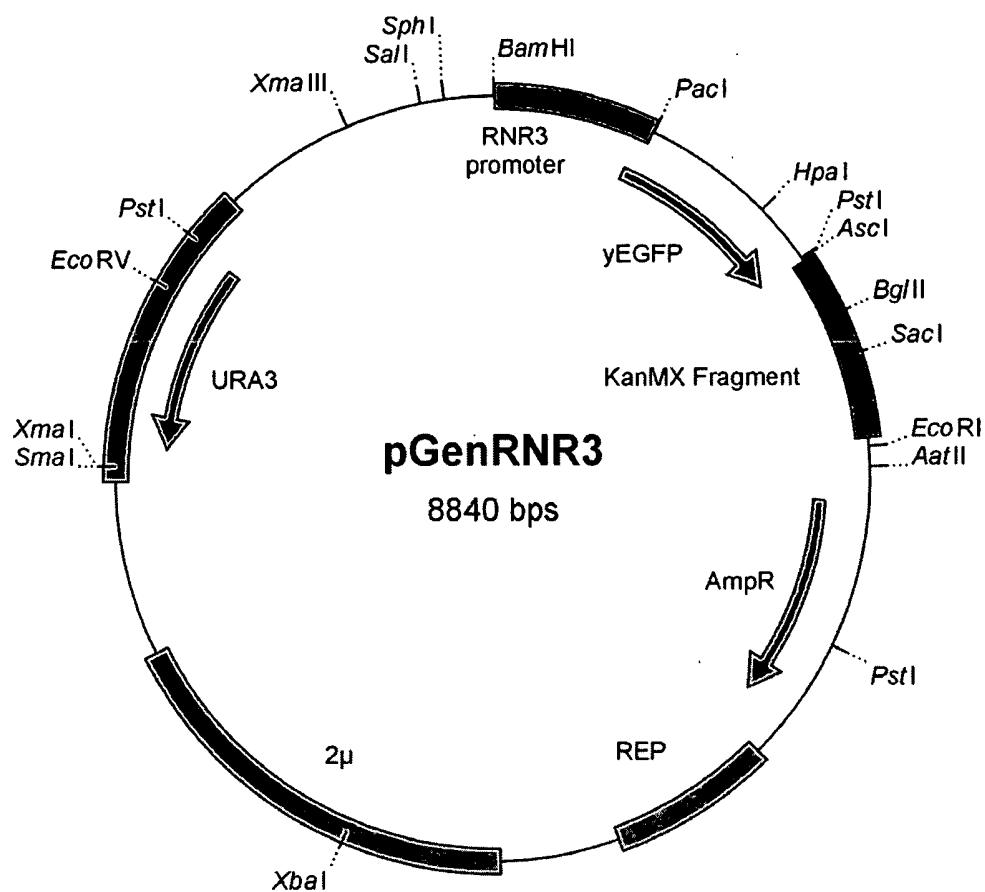
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FIG. 24



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FIG. 25



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FIG. 26

pGenRNR2

GGATCCGTACCTTCCAGCATTGTCCTCTGAGAAAACAAAATGGAAGATTTGTGAAATGCAGTAAGTGA
CAATAAGCTAGCGACTTTCAATGATCGCAGATTAAGTATATACACTTAAAGCTCTCTCTCTTAC
TAGCTACGAAAAACAAAGAAAAACAAAATAGAGGGAAAAAGATATACGTATAAAATATGCTCCA
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TGTCTCCCTTAACTGAATTCAAGATGAAGGAACATAACAGAACGGAAAACAAAAAAAGGGAAAGAAAAAGA
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TTCCTCATCATTCCCTTTCGCTTCTCTGTCTTTATTCTCTTTTTAATTGTCCTC
GATTGGCTATCTACCAAAGAACATCCAAACTTAATACACGTATTATTGTCCAATTACCATGTTAATTAACTC
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TGGTAAATTGCCAGTTCCATGCCAACCTAGTCACTACTTCGTTATGGTGTCAATGTTGCGAGATA
CCCAGATCATGAAACACATGACTTTCAAGTCTGCCATGCCAGAAGGTTATGTTCAAGAAAGAAACTAT
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CATTGAAGATGGTCTGTCATTAGCTGACCATATTCAACAAACTCCAAATTGGTGTGTCAGTCT
GGTACAGACAACCAATTACTTATCCACTCAATCTGCCATTACCAAGATCCAAACGGAAAAGAGAGACCAT
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AGGATAACAGGGTAATATGATCTGCCGGGGAAAGGCGAACCCGATGGATGCATCCCTCTGCTGCCA
TGATGCTGAAGTTGCTGTTAACATGGTTGCTGCCGGCGAGGGCGGTGAGCAGGAGTGCAGGAGGTGTTGG
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CTCAGCGCAATCACGAATGAATAACGGTTGGTGTGCGAGTGATTTGATGACGAGCGTAATGGCTGGCAG
CTGTTGAACAAGTCTGAAAGAATGATAAGCTTTCGCACTCCACCGGATTCACTCATGGTGA
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TCAGAGGTTTACCGTCA

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TCACCGAAACGCCGAGGCAGAGCTTGAAGAAAATGCCCTATTCAATCTTGCTAAAAAATGGCC
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CGAGCGATCCTGAAGCTGTCCTGATGGTCGTACACCTGCCCTGGACAGCATGCCCTGCAACGCCGGCA
TCCCGATGCCGCCGAG

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CGAGAAGAATCATAATGGGAAGGCCATCCAGCCTCGCGTCGCGAACGCCAGCAAGACGTAGCCCAGCGCT
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GAGCGAGGGCGTGCAAGATCCGAATACCGCAAGCGACAGGCCGATCATGTCGCGCTCCAGCGAAAGCGGT
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GTGCGGCAGCATAGTCATGCCCCGCGCCCACCGGAAGGAGCTGACTGGGTTGAAGGCTCTCAAGGGCATCG
GTGACGCTCCCTTATGCGACTCCTGCATTAGGAAGCAGCCCAGTAGTAGGTTGAGGCCGTTGAGCACCG
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FIG. 27

PGenRNR3

GGATCCAGAAAACAAGAGAAGGTAACAAGCACATAAAAATCAGCACATACGTACATACATAAGAATGAATCG
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CATTCAAATATGTTACCTCGCTCATGAGACAATAACCCGTATAATGCTTCAATAATATTGAAAAGGAAGAGT
ATGAGTATTCAACATTCCGTGTCGCCCTTATTCCCTTTTCTGCGGCAATTGCTTCTGTTGCTCAC
CCAGAAAAGCTGGTAAAGTAAAAGATGCTGAAGATCAGTGGGTGACAGTGGGTACATCGAAGTGGAT
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AGCAGAGCGCAGATACCAAATACTGCTCTTAGTGTAGCCGTAGTTAGGCCACACTTCAGAAACTCTGTA
GCACCGCCTACATACCTCGCTC

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AGTACCGGATAAGGCGCAGCGGTGGCTGAACGGGGGTTCGTCACACAGCCCAGCTGGAGCGAACGA
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CCAACAATAATATGTCAGATCCTGTAAGAGACCACATCATCCACGGTTCTATACTGTTGACCCAATGCGTCT
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TCCGCCGCTGCTCAAACCGTAACAAATACCTGGGCCACCAACCCGTGTCATTGTAATGCTGCCCAT
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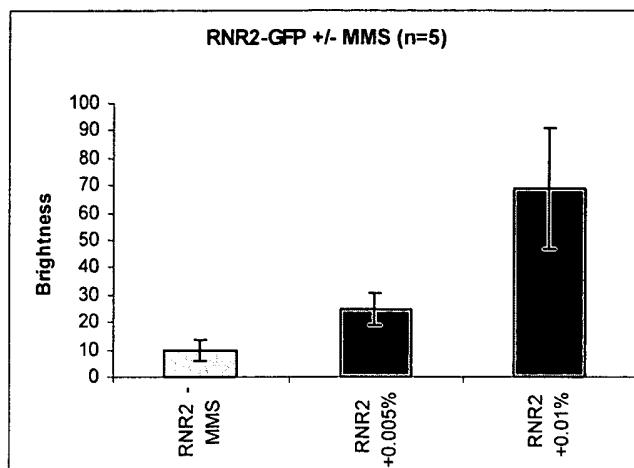
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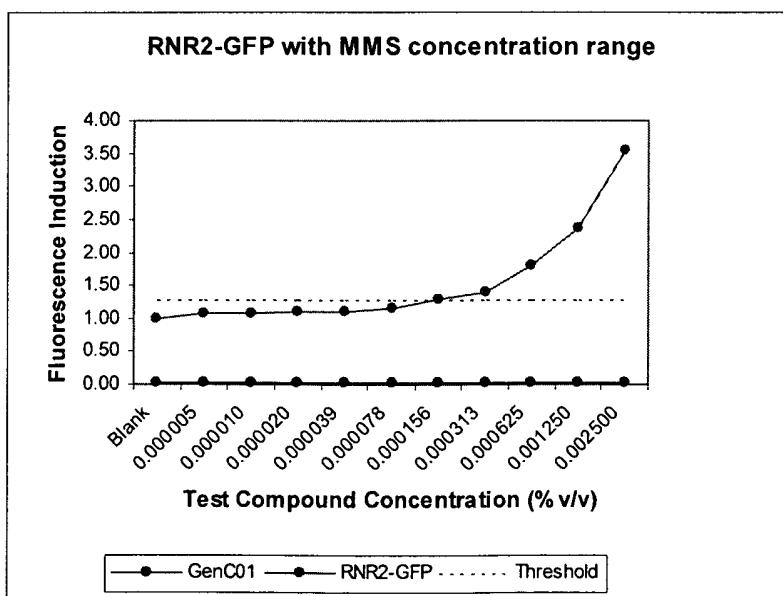
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FIG. 28

A



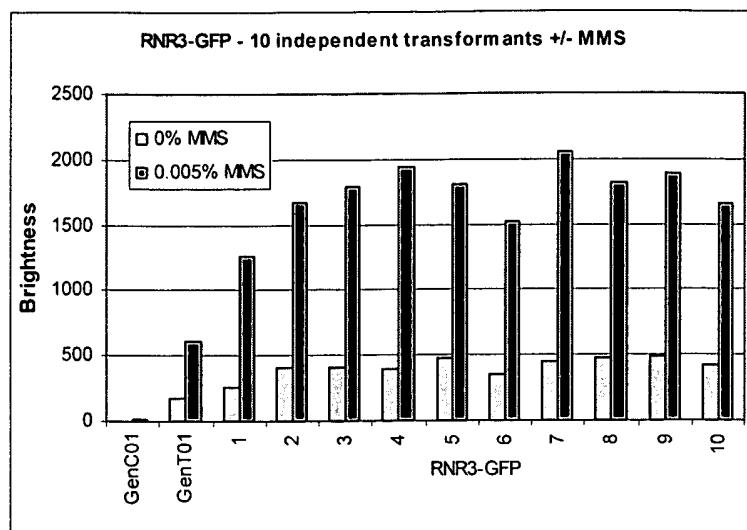
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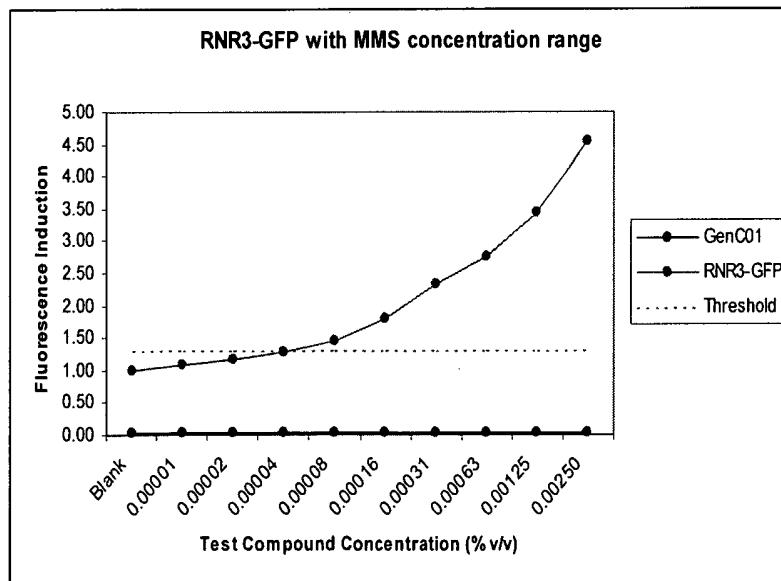
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FIG. 29

A



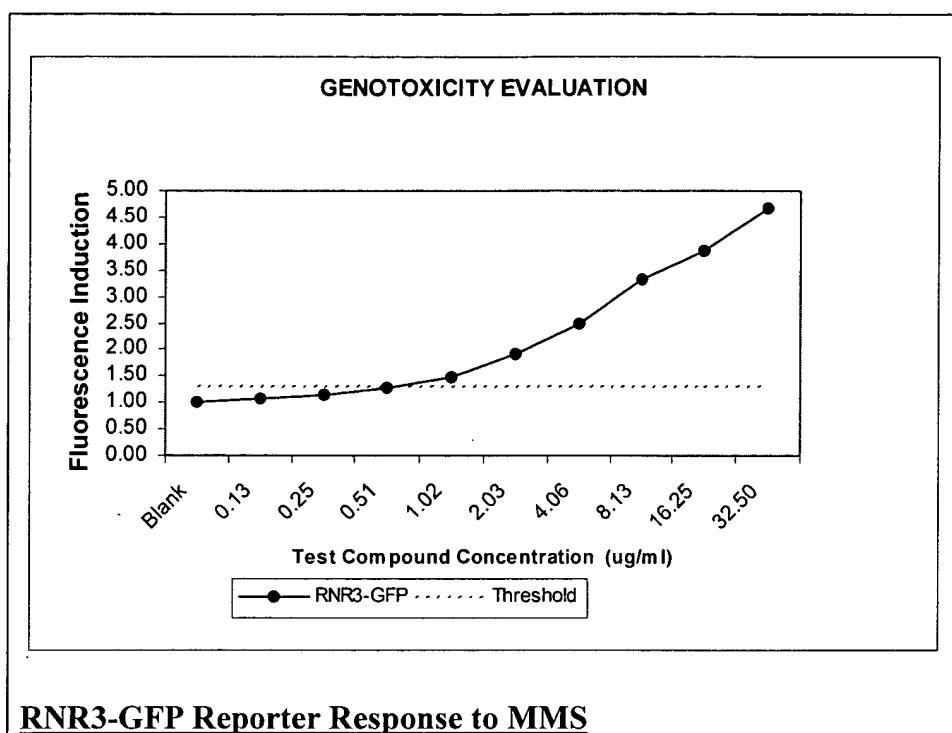
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Fig:30

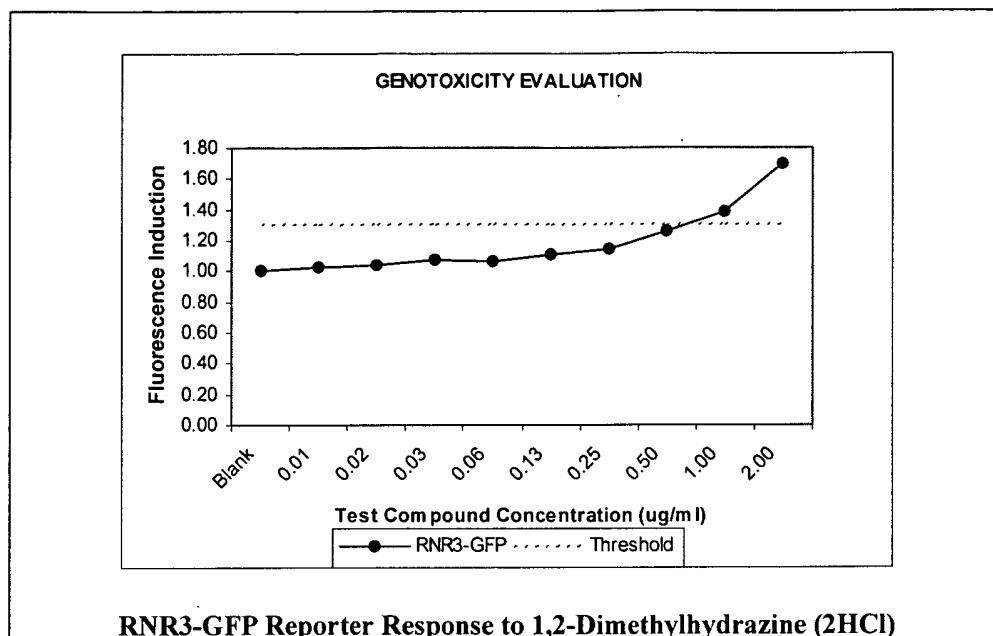
Methyl methanesulfonate



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Fig:31

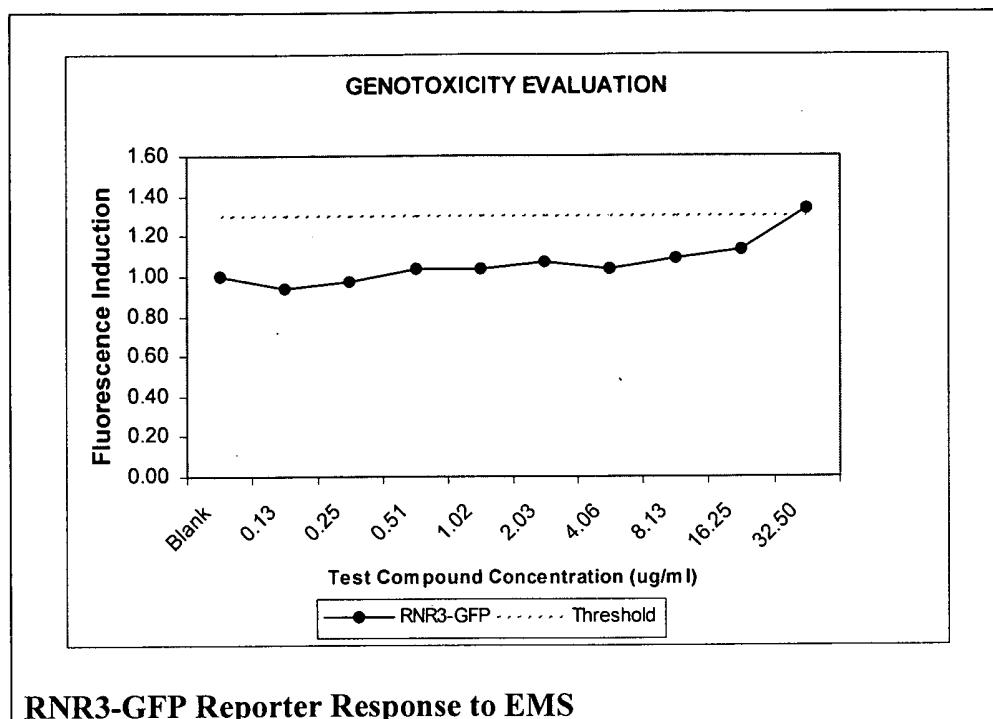
1,2-Dimethylhydrazine (dihydrochloride)



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Fig:32

Ethyl methanesulfonate



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Fig:33

RNR3 sequence data downloaded from SGD, Chromosome IX:

1 AGATTCTGCG CCAGCAAGTC GTCTCCGAGG GGGGGCCAC CGCTACCATA
51 CAGTCAGGT TTAACATACGC ATGGGGGCTG ATCAAATCCA CTGACGTGAA
101 TGACGAAAGG CTTGGTGTGA AAATCCTCAC AGACATTAC AAAGAGGCCG
151 AGTCCCGTAG ACGAGAATGC CTATATTATC TGACCATAGG TTGCTACAAA
201 CTCGGTGAAT ACTCTATGGC GAAGAGATAT GTAGACACTT TATTTGAGCA
251 TGAGCGTAAT AACAAAGCAGG TGGCGCTTT GAAGAGTATG GTAGAGGATA
301 AGATCCAGAA GGAAACACTC AAGGGTGTG TCCTCGCTGG AGGCCTACTA
351 GCCGGCGCTG TGGCCGTGGC TAGTTCTTC TTAAGAAACA AGAGAAGGTA
401 ACAAGCACAT AAAAATACAG CACATACGTA CATACTAAG AATGAATCGC
451 ACGCACCGT AAACATTAT CATTAACTCT TCAGTTGTTA GATAAAAAAA
501 AAAAGAAAAG AAAAGAAAAGT GAAGGCTTGT TTCAGTTGTA ACTAGGTAGC
551 AGAGCAAGCC CTCGTTCTTG GCTGCTAATT TTCTCTAAAGT AGTAAAAAAA
601 GCCAAGTTAT CTGCCTACGG TTGTCACAGC AACATTGCGT GCGGTTGTTC
651 TTTTGTTTTT TTTTTTTTTT TTTTTCTGT GTTGTGCGAG CAACGACACC
701 TAGGCCTGTC TCAAAGGGGC AAAAACCCGG TTGCCATGGC GAGGACCAAA
751 CGACAAGATG GGAAAAAAAC AATAGTCTAT TGTTAAATCG TAATACTGTA
801 TTGTGAGATG CTGACCGCTT TCGTTTTCTG TGTCAAGCCTT CTTTATATTG
851 TTTCTGTTT TGCTGCAAAA CGTATATAAA CGCACTGCTA TTTGCTTCTC
901 TTTGCTTC TTCTTGCCT TTCTCTCATC TCATATCCAA GTTGAATAA
951 ATATGACAAG CAAGAATAGC AGCACCAATA AATCAAATAC TCCCCACACAA
1001 ATGTACGTT TTAAAGAGA CGGCCGCAA GAGCCCGTTC AATTGATAA
1051 AATTACCTCC CGTATCACCC GTTGTCTATA CGGTTTAGAC CCAAACCGTA
1101 TTGATGCTGT TAAGGTAACC CAACGTATTAA TTTCTGGTGT GTACTCCGGT
1151 GTTACTACCG TTGAGCTGGA CAATCTTGCA GCTGAAACAT GTGCATACAT
1201 GACCACTGTG CACCCGTATT ATGCCACTCT AGCCGCTAGA ATGCCATCT
1251 CTAACCTACA TAAGCAAACC ACAAAAGCAAT TCTCCAAAGT TATTGAGGAT
1301 TTACACGACT GGATTAACCC AGCTACTGGA AAGCATGCTC CTATGATTTC
1351 GGACGAAATT TACAACATTG TCATGGAAA CAAAGATACT TTGAACCTGG
1401 CCATCGTGT CGATAGGGAT TTCCAGTATA CGTATTCGG ATTCAAGACA
1451 CTGGAGCGTT CGTACTTGCT AAGACTGAAC GGTGAAGTGG CAGAACGTCC
1501 TCAGCATTG GTAATGCGTG TGGCGCTAGG TATCCATGGT AGCGATATCG
1551 AATCTGTGCT GAAGACTTAT AATTGATGT CGTTAAGATA CTTCACTCAC
1601 GCTTCCCCAA CTTTATCAA CGCTGGTACG CCACATCCCTC AAATGTCTTC
1651 ATGTTTCTTA ATTGCCATGA AGGATGACTC TATCGAAGGT ATTTATGATA
1701 CTTTGAAAGA ATGTGCTATG ATTCCAAA CTGCAAGGTGG TGTGTTGCTT
1751 CATATCAACA ACATCCGTT CACAGGTCT TATATCGCTG GTACCAACGG
1801 TACTTCAAAC GGGTTGATTG CTATGATTG TGTTTCAAT AATACTGCC
1851 GTTATGTGGA CCAGGGTGGT AACAAAGAGAC CTGGTGCTTT CGCCCTTTTC
1901 TTGGAGCCAT GGCATGCGAGA TATCTCGAC TTTGTCGATA TCAGAAAAAC
1951 ACATGGTAAG GAAGAAATTG GTGCAAGAGA TTTGTTCCCT GCTCTATGGA
2001 TCCCTGATCT TTTCATGAAA CGTGTCAAG AGGATGGGCC TTGGACTTTG
2051 TTTTCGCCCA GTGCTGCCCA AGGTTAGAT GATGTGTGGG GTGATGAATT

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2101 TGAAGAACTA TATACTCGTT ACGAAAGAGA AGGTCGTGGT AAAACAATTA
2151 AAGCCCAAAA GTTGTGGTAT GCCATTTGC AAGCACAGAC AGAAACAGGT
2201 ACACCTTCA TGGTTTATAA GGACGCATGT AACAGGAAGA CAAACCAACA
2251 GAACCTAGGT ACTATCAAAT CATCTAATTT ATGTTGTGAA ATCGTCGAAT
2301 ATTCCCTCCC GGATGAAACT GCAGTTGTA ATTTAGCTTC TATTGCCCTA
2351 CCAGCATTG TGAGGTTTC AGAAGATGGT AAAACTGCAA GCTATAATT
2401 CGAGAGATTA CACGAGATTG CTAAGTCAT TACTCACAAC TTGAACAGAG
2451 TTATCGACCG TAATTACTAT CCAGTCCCG AGGCTAGAAA TTCAAATATG
2501 AAGCATAGAC CTATTGCTCT TGGTGTCCAG GGTTTGGCCG ATACTTATAT
2551 GATGTTGCGT CTACCCCTTG AATCGGAAGA AGCTCAAAC CTAAACAAAC
2601 AAATCTTCGA AACTATTTCATGCTACTC TTGAAGCCTC CTGTGAATTG
2651 GCCCAAAAG AAGGTAAATA TTCTACTTT GAAGGTTCTC CAGCTCTAA
2701 GGGTATTTCA CAATTCCATA TGTGGAACGC TAAACCATTT GGCATGTGGG
2751 ATTGGGAAAC CTTAAGAAAG GACATTGTT AACATGGTT AAGAAACTCT
2801 TTGACTATGG CACCAATGCC AACCGCCTCA ACTTCCCAA TTCTGGTTA
2851 TAATGAATGC TTCGAACCCAG TGACCTCAAA CATGTAECT CGTCGTGTCC
2901 TGTCTGGTGA ATTCCAAGTT GTTAATCCAT ATTTACTACG TGATTAGTC
2951 GACCTGGGTA TTTGGGATGA TAGTATGAAA CAATATCTAA TTACACAAAAA
3001 TGGTTCTATT CAAGGCTTAC CAAATGTGCC ACAAGAATTG AAGGAATTAT
3051 ACAAAACCGT CTGGGAAATC TCTCAAAAGA CCATTATCAA TATGGCTGCT
3101 GATCGTGCCA TCTACATCGA TCAGTCTCAT TCCTGAAATC TTTCTTGCA
3151 AGCACCATCA ATGGGTAAGA TTACTAGTAT GCATTTCTAC GGTTGGAAGA
3201 AGGGTTAAAG AACTGGTATG TACTACTAA GAACGCAAGC CGCCTCCGCT
3251 GCTATTCAAT TTACCATGTA TCAAGAGGTT GCCGATCAAG CCGCTACACA
3301 TATTGCTTCC GTCTCAGAAT TGGATCGTCC AGTTTATGTT CCAAAGGGTA
3351 CAAAATTCTC TGAACAAAAG GCGGCATCTG CGCTTACCGA AAGCTCAGAT
3401 AATGAGAAGG ATGCATCTCC AGTTCATCC GAACAAATCAT CGGTGTCGAG
3451 TGCCATGTCA AATGTGAAAT TGGAAAGATAG TGTTGCCCA GCAGTTCCAA
3501 CGGAAACAAAT AAAAGAAGAT TCCGACGAGA AGAAATGTGA CATTACAAT
3551 GAAAAGGTGA TTGCTTGTAC TGCTCCTACT CCAGAAGCTT GTGAGTCATG
3601 TTCCGGTTGA

Removal of Bacterial Origin of replication and Amp Resistance

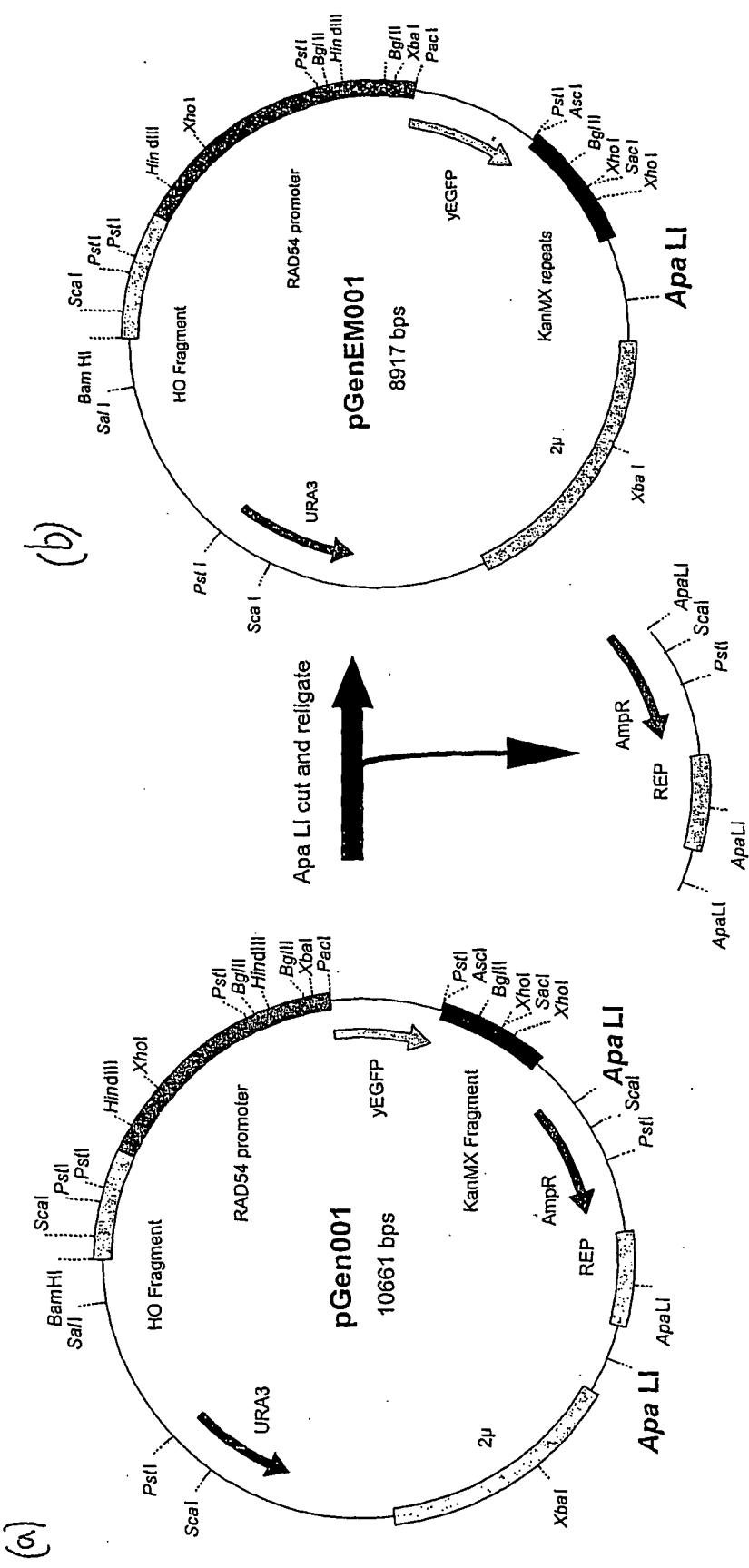


Fig: 34

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Fig:35

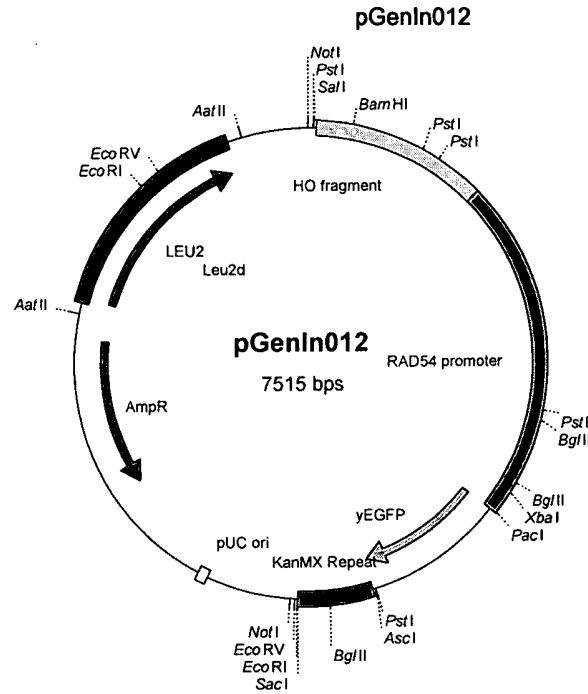
Fragment of HO sequence used in the integrating vector (pWDH443)

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1  AAATTGTGAC AGCTTCCAG AATGGATTAT TTTCTCAA ATTCCTTGT
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101 ACGTAGCGGA ACGTGATCGT CACAAACCGT AAGGTAGAGA CCCCAGATT
151 TCGCATTTTC TCTTAAACTC TCCATTAGCT TAGGATCCAA GCTATCTACT
201 GAGATTTCTG GCTCTTTGT TGACTGTCA CCTAACACAA GACCAAGCAT
251 CCAAGCCATA CTTTTACAG CAGGAGTTAC AAGGTCACTA CGTCCAGTGA
301 GAAATTTAGA TAAAACACCA TTCTGCGA GTACTGGACC AAATCTTATG
351 CAGCTAGAAA TTCTCAATTG AGCATCAAGA TAATCCAAAT CTCTAACTTC
401 AATGTCAAAG TTGAAATATT CTCCTTAAAG GCGCTCCATT TCTTCTATGA
451 AGCGTTTGGC GGCAAACCTCA CCTTCAACTG TCATTGGAA TGTCTTATGA
501 TGGTTTTTG GAATTATTAT TATCCTACCA TCAAGCGTCT GACATTGCTG
551 CAGATTTCCTC CATCTCACTT TATATTGGT GGCAATTCTA CCACTTTTT
601 CCAACAGTGG TTTGGTAGGG ACCCTGACTG ACAATTATG ACCTGCAGTA
651 CATTGTAATG CAAGACGCTG ATAAACTGTT CTACGCCTGG GATCTAACCT
701 ACCAGGTTCA CCTTCAAAG CTCGTGTTT GGTTTTTG TGATATTAT
751 AGATTTCTG ATAGCCTGT GTGACATTAA TGACGCGGGC AGCGGAGCCA
801 TCTGCGCACA TAACGTAAGA GTTAGCCGTG ACGTTGCGA TGTCTTAAT
851 TTCACCGTTA GCCATCAGAA TAGTCGTGTT TTCAGAAAGC AT

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Fig:36



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Fig:37

rDNA sequence used in multiple copy rDNA integrating plasmids

1 GATCTGACGA TCACCTAGCG ACTCTCTCCA CCGTTTGACG AGGCCATTAA
51 CAAAAACATA ACGAACGACA AGCCCTACTCG AATTCTGTTTC CAAACTCTTT
101 TCGAACATTGT CTTCAACTGC TTTCGCGATGA AGTACCTCCC AACTACTTTT
151 CCTCACACTT GTACTCCATG ACTAAACCCCC CCCTCCCATC ACAAAACTAAA
201 ATCTTACTTT TATTTTCTTT TGCCCTCTCT GTGCCTCTGC CTTAACTACG
251 TATTCTCGC CGAGAAAAAC TTCAATTAA GCTATTCTCC AAAAATCTTA
301 GCGTATATT TTTTCCAAA GTGACAGGTG CCCGGGTAAC CCCAGTTCC
351 CACTATTTT TACTGCGGA CGGGAAGCGG AAAATACGGA AACGCGCGGG
401 AACATACAAA ACATACAAA TATACCTTTC TCACACAAGA AATATATGCT
451 ACTTGCAAAA TATCATACCA AAAAACCTTT CACAACCGAA ACCAAAACCA
501 ACGGATATCA TACATTACAC TACCAACATT CAAACTTAC TACTATCCTC
551 CCTTCAGTT CCCTTTTCT GCCTTTTCG GTGACGGAAA TACGCTTCAG
601 AGACCCCTAAA GGGAAATCCA TGCCATAACA GGAAAGTAAC ATCCCAATGC
651 GGACTATACC ACCCCACCCAC ACTCCTACCA ATAACGGTAA CTATTCTATG
701 TTTTCTTACT CCTATGTCTA TTCACTTTTC ATCTGACTAC CTAATACTAT
751 GCAAAAATGT AAAATCATCA CACAAAACAT AAACAATCAA AATCAGCCAT
801 TTCCGCACCT TTTCTCTGT CCACTTTCAA CGGTCCCTCC AAATGTAAAAA
851 TGGCCTATCG GAATACATT TCTACATCCT AACTACTATA AAACAACCTT
901 TAGACTTACG TTTGCTACTC TCATGGTCTC AATACTGCCG CCGACATTCT
951 GTCCGACATA CTAATCTCT CTCCTCATC ATGCCCGCA TCCGGTGC
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1101 CTTGAAACTA CCTCTGCATG CCACCTACCG ACCAACTTTC ATGTTCTGTT
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1551 TAAATCCCAT AACTAACCTA CCATTGATT CAGAAAAATT CGCACTATCC
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2701 CTAAGTCGTA TACAAATGAT TTATCCAC GCAAAATGAC ATTGCAATTG
2751 GCCAGCAAGC ACCCAAGGCC TTTCGCAAA GTGCACCGTT GCTAGCCTGC
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3651 GCTGTGGTT CGCTAGATAG TAGATAGGGA CAGTGGGAAT CTCGTTAAC
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4001 GAGCAAGGCC CACCAAGCAG TCCACAAGCA CGCCCGCTGC GTCTGACCAA
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4401 GGTTCCGGAA TCTTAACCGG ATTCCCTTTC GATGGTGGCC TGCATAAAAAT
4451 CAGGCCTTG AAACGGAGCT TCCCCATCTC TTAGGATCGA CTAACCCACG
4501 TCCAACGTGCT GTTGACGTGG AACCTTCCCA CACTTCAGTC TTCAAAGTTC
4551 TCATTTGAAT ATTTGCTACT ACCACCAAGA TC

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Fig:38

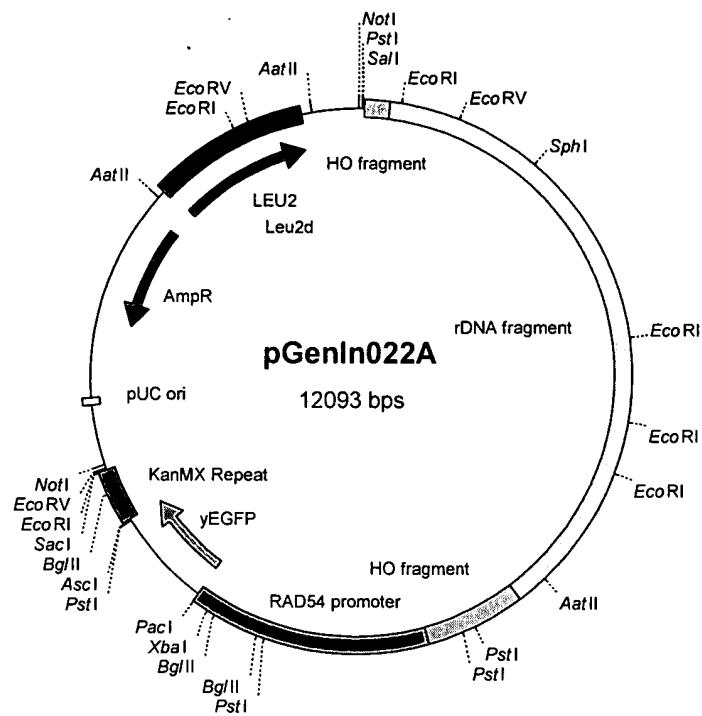
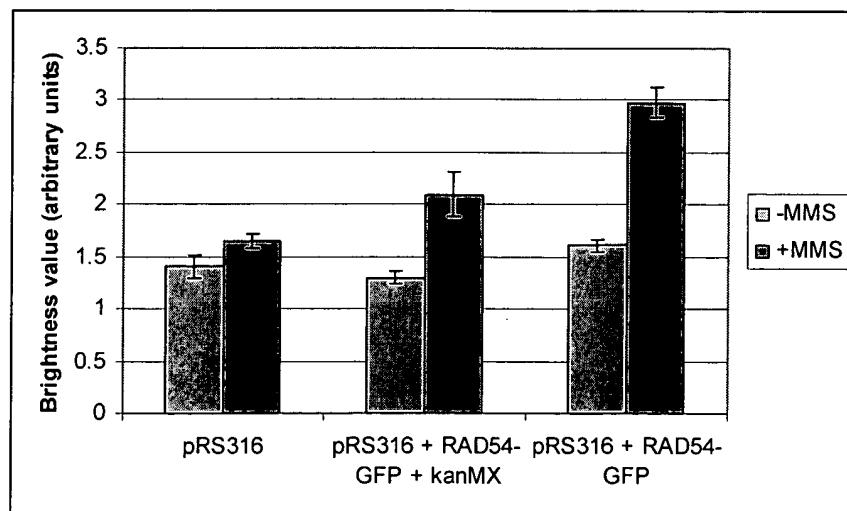
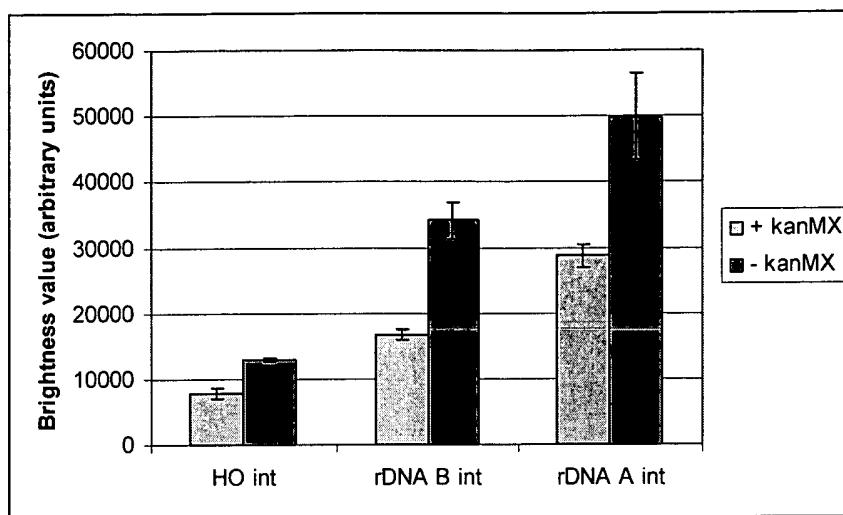


Fig:39



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Fig:40



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Fig:41 pGenIn012 - 7515 bp

1 GAACGCGGCC GCCAGCTGAA GCTTCGTACG CTGCAGGTCG ACGGATCAAA
51 ATTGTGACAG CTTTCCAGAA TGATTATTT TTCCCTAAAT TCCTTGTCTT
101 CCTGTTTCAG TCTGGACCAT CTCCATAATG AAGCCTTACA TGTTTGGCAC
151 GTAGCGGAAC GTGATCGTCA CAAACCGTAA GGTAGAGACC CCAGATTTTC
201 GCATTTCTC TTAAACTCTC CATTAGCTTA GGATCCAAGC TATCTACTGA
251 GATTCTGGC TCTTTGTTG TACTGTCACC TAACCACAGA CCAAGCATCC
301 AAGCCATACT TTTTACAGCA GGAGTTACAA GGTCACTACG TCCAGTGAGA
351 AATTAGATA AAACACCAATT TCCTGCGAGT ACTGGACCAA ATCTTATGCA
401 GCTAGAAATT CTCAATTGAG CATCAAGATA ATCCAAATCT CTAACCTCAA
451 TGTCAAAGTT GAAATATTCT CCTTTAGAGC GCTCCATTTC TTCTATGAAG
501 CGTTTGCAG CAAACTCACC TTCAACTGTC ATTGGGAATG TCTTATGATG
551 GTTTTTGGA ATTATTATTA TCCTACCAC AAGCGCTGCA CATTGCTGCA
601 GATTCTCCA TCTCACTTTA TATTTGGTGG CATTCTTAC ACCTTTTTCC
651 AACAGTGGT TGGTAGGGAC CCTGACTGAC AATTATGAC CTGCACTACA
701 TTGTAATGCA AGACGCTGAT AAACGTTCT ACGCCTGGGA TCTAACCTAC
751 CAGGTTCACTC TTCAAAAGCT CTGTGTTTGG TTTTTGCTG TATATTATAG
801 ATTTCTGAT AGCCCTGTGT GACATTATG ACGCGGGCAG CGGAGCCATC
851 TGCGCACATA ACGTAAGAGT TAGCCGTGAC GTTGCATG TCTTAATT
901 CACCGTTAGC CATCAGAATA GTCGTGTTT CAGAAAGCAT TTTGATCCGA
951 CATACTGATGA CCTCAATGAT TTAGATTATG TGTTGCACTT TTATAGACCT
1001 ACCAAAAATC CAGTGCCTAC ACTAATACCT TCATAAAAGAT ACCTGAAACA
1051 ATAACCAGAA AGATCGCAA AAAAATTTTT TTTCTTGCC GAGATCACAA
1101 ACCTACTATG ACGAAAAAGC TTGAAGTTA GATGAGTAAG GAAAATACAA
1151 GTGACGCTTT TATATGGTGC AAGGAACAAA AACTAAAAAC ACAAGGGCAA
1201 ATGTGGATCT GTCATGTATG GCAACGACAG CAGGATGGCT CACAAAAAAA
1251 GACAAAAAAA ACTAAGGCAA AAGAACAAAG CTCTCTCCT GCTCAAGAAA
1301 CCTATTGTTG AAAAACCCACC GTCGTAAGAA AGTTTTCTG TGACCTATAA
1351 TGGTTAAAAA TCGGCCATT TTTTTCCCT CTTTTGTTG CCACTCTTTC
1401 TCATACCGA GGGAAATTG ACACAAACAG CCGGAAAGTG TGGCTAAACC
1451 GGCAAGTGCC TGCAAGATCC ACAGAACTAA CCGCACGAAC TGGCGGTAG
1501 AAAAGAGCCT GTTCCGGAAA GAGAGAAACA GAGAAACGAT CATGATGGGA
1551 AAGCGGGGAT TCGGCGAAGA ACGAGACTGG AAAGGGAAAA AGAGAAATAC
1601 TGGTGGAAAGT ATTGGGACCT TTGGCGAAGT CCGAACCCCTT GAAACCCAAA
1651 GATGATCGAT GATTCAATT TCAATGCGCT ACGGTTCTG CCGCTCGTGG
1701 GAACCCCACG CAAACATAT TATTCGCTTC TCTCTGCTGA CAACTCCGGT
1751 TTACGTTATA CCGTATTAGG ATCACTATAA GGGTTCTTC GGGAGGAGGG
1801 GGGAGGGGAA GAATGTACAT CGTCATAAGG CCTTTATGGT GTGAAGTGGG
1851 TTTTGCCTGG AAAATTGTT TTCAATGATA TAGAGCCCAC GCATATACGT
1901 ACATACTAGT GGCCAAAAGC GTGGGGTGGG CGGACAAAGC TACACTGGTA
1951 AAATACAGGA TTCTATGAAAC AATAACAACA ACCAGCTCAC GTTGCTGAAC
2001 AGCCGAGGTC AGCCGATGCA ACCGAGGTTT CCAAAGTAGC ATTTCTGTGC
2051 TAGCTATGTC TGTAGGTTA CATTAATGG TGCGTGGTTC CAGCTTCATG
2101 TGCTTGCATG TGATGTCCTG CAGATGGTA GAAGATTCTG AAAGCCGCGC
2151 TAGGAGAAAA ATATTCTGCT CGAAGATCTG TCCTCTTAAG TAGAAAGCGT
2201 GAAATTGTTG CGTTCTGCA TTACTACTCA ACAGCGTACGC AAATGCGTCT
2251 ACTGCACCTG CATGATAAAG CTTATGTATC AAAAATTTAA CATCTTGAAA
2301 ATACACAAGT GGTGCAAAGA TGTGTCACGT TCTGGACCTG AGTGGTGCCA
2351 TGTATGCTAT TTAACATGCA AAGGGAAAGA CCCTTCCGCC TTACTGCAAT
2401 AATAAAAAAGT ATTTTACCGC TTACCCAATA TAGCAAAGTT TCGCGCAAAA
2451 AAAAAAAATAA AAAACAATTA CAAACAAAAA GAAAAAAAG GAAATAATAG
2501 AAGATCTAAC TGAAGCGAAG GCCAAAACCTC TTCTCACTTG ACGTAATAGC

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2551 CGATACAAAA TCTAGAGCAG CAACTTTCT CTTTCTTCAC TAAAGCTGCT
2601 ACGAAAGTAT AGAAAAATCA AACGCTCAGA ACTTAGCTCT ATTTCAAGGT
2651 ACCATATATA TTTCCCTTATA ACTGATGTTA ATTAACCTA AAGGTGAAGA
2701 ATTATTCACT GGTGTTGTCC CAATTTGGT TGAATTAGAT GGTGATGTTA
2751 ATGGTCACAA ATTTCTGTC TCCGGTGAAG GTGAAGGTGA TGCTACTTAC
2801 GGTAAATTGA CCTTAAAATT TATTTGTACT ACTGGTAAAT TGCCAGTTCC
2851 ATGGCCAACC TTAGTCACTA CTTTCGGTTA TGGTGTCAA TGTTTGCGA
2901 GATACCCAGA TCATATGAA CAACATGACT TTTTCAAGTC TGCCATGCCA
2951 GAAGGTTATG TTCAAGAAAG AACTATTTT TTCAAGATG ACGGTAACTA
3001 CAAGACCAGA GCTGAAGTCA AGTTGAAGG TGATACCTTA GTTAATAGAA
3051 TCGAATTAAA AGGTATTGAT TTTAAAGAAG ATGGTAACAT TTTAGGTAC
3101 AAATTGGAAT ACAACTATAA CTCTCACAAAT GTTACATCA TGGCTGACAA
3151 ACAAAAGAAT GGTATCAAAG TTAACTCAA AATTAGACAC AACATTGAAG
3201 ATGGTCTGT TCAATTAGCT GACCAATTAC AACAAATAC TCCAATTGGT
3251 GATGGTCCAG TCTTGTACC AGACAACCAT TACTTATCCA CTCAATCTGC
3301 CTTATCCAA GATCCAAACG AAAAGAGAGA CCACATGGTC TTGTTAGAAT
3351 TTGTTACTGC TGCTGGTATT ACCCATGGTA TGGATGAATT GTACAAATAA
3401 CTGCAGGGCG CGCCACTTCT AAATAAGCGA ATTTCTTATG ATTTATGATT
3451 TTTATTATTA AATAAGTTAT AAAAAAAATA AGTGTATACA AATTTAAAG
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3551 TGTAGGTCAAG GTGCTTCT CAGGTATACT ATGAGGTCGC TCTTATTGAC
3601 CACACCTCTA CCGGCAGATC CGCTAGGGAT AACAGGGTAA TATAGATCTG
3651 CCCGCCGGGA AGGCAGAACCC GATCGGATGC ATCCTCTCG CTGCCATGAT
3701 GCTGAAGTTG TCGTTGAACA TGGTTGCTGC CGCGAGGGCG GTCGAGCAGG
3751 CAGTGCAGGA GGTGTTGGAC TCGGGAGTCA GAACGGCGA CCTGCTCGGC
3801 TCGAGCTCGA ATTCACTCGAT GATATCAGAT CCACTAGTGG CCTATGCGC
3851 CGCGGATCTG CCGGTCCTCC TATACTGAGT CGTATTAATT TCGATAAGCC
3901 AGGTTAACCT GCATTAATGA ATCGGCCAAC GCGCGGGAG AGGCGGTTT
3951 CGTATTGGGC GCTCTCCGC TTCCCTCGCTC ACTGACTCGC TGCGCTCGGT
4001 CGTTCGGCTG CGCGCAGCGG TATCAGCTCA CTCAAAGGCG GTAATACGGT
4051 TATCCACAGA ATCAGGGGAT AACGCAGGAA AGAACATCTG AGCAAAAGGC
4101 CAGCAAAAGG CCAGGAACCC TAAAAAGGCC GCGTTGCTGG CGTTTTCCA
4151 TAGGCTCCGC CCCCCCTGACG AGCATCACAA AAATCGACCG TCAAGTCAGA
4201 GGTGGCGAAA CCCGACAGGA CTATAAAAGAT ACCAGGCCTT TCCCCCTGG
4251 AGCTCCCTCG TGCGCTCTC TGGTCCGACC CTGGCGCTTA CGGGATACCT
4301 GTCCGCCCTT CTCCCTCGG GAAGCGTGGC GCTTCTCAA TGCTCACGCT
4351 GTAGGTATCT CAGTTGGTG TAGGTCGTT GCTCCAAGCT GGGCTGTGTG
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4451 TCTTGAGTCC AACCCGGTAA GACACGACTT ATGCCACTG GCAGCAGCCA
4501 CTGGTAACAG GATTAGCAGA GCGAGGTATG TAGGCGGTGC TACAGAGTTC
4551 TTGAAGTGGT GGCCTAACTA CGGCTACACT AGAAGGACAG TATTTGGTAT
4601 CTGCGCTCTG CTGAAGCCAG TTACCTTCGG AAAAGAGTT GGTAGCTCTT
4651 GATCCGGCAA ACAAAACACC GCTGGTAGCG GTGGTTTTTG TGTTGCAAG
4701 CAGCAGATTA CGCGCAGAAA AAAAGGATCT CAAGAAGATC CTTGATCTT
4751 TTCTACGGGG TCTGACGCTC AGTGGAACGA AAACTCACGT TAAGGGATT
4801 TGGTCATGAG ATTATCAAAA AGGATCTCA CCTAGATCCT TTTAAATTAA
4851 AAATGAAGTT TTAAATCAAT CTAAAGTATA TATGAGTAA CTTGGTCTGA
4901 CAGTTACCAA TGCTTAATCA GTGAGGCACC TATCTCAGCG ATCTGTCTAT
4951 TTCGTTCATC CATAGTGCC TGACTCCCCG TCGTGTAGAT AACTACGATA
5001 CGGGAGGGCT TACCATCTGG CCCCAGTGCT GCAATGATAC CGCGAGACCC
5051 ACGCTCACCG GCTCCAGATT TATCAGCAAT AAACCAGCCA GCCGGAAGGG
5101 CCGAGCGCAG AAGTGGTCTT GCAACTTTAT CCGCCTCCAT CCAGTCTATT
5151 AATTGTTGCC GGGAAAGCTAG AGTAAGTAGT TCGCCAGTTA ATAGTTGCG

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5201 CAACGTTGTT GCCATTGCTA CAGGCATCGT GGTGTCACGC TCGTCGTTG
5251 GTATGGCTTC ATTCAGCTCC GGTCCCAAC GATCAAGGCG AGTTACATGA
5301 TCCCCCATGT TGTGCAAAAA AGCGGTTAGC TCCTTCGGTC CTCCGATCGT
5351 TGTCAGAAGT AAGTTGGCCG CAGTGTATC ACTCATGGTT ATGGCAGCAC
5401 TGCATAATTCT CTTACTGTC ATGCCATCCG TAAGATGCTT TTCTGTGACT
5451 GGTGAGTACT CAACCAAGTC ATTCTGAGAA TAGTGTATGC GGCGACCGAG
5501 TTGCTCTTGC CCGCGTCAA TACGGGATAA TACCGCGCCA CATAGCAGAA
5551 CTTTAAAAGT GCTCATCATT GGAAAACGTT CTTCGGGGCG AAAACTCTCA
5601 AGGATCTTAC CGCTGTGAG ATCCAGTTCG ATGTAACCCA CTCGTGCACC
5651 CAACTGATCT TCAGCATCTT TTACTTCAC CAGCGTTCT GGGTGAGCAA
5701 AAACAGGAAG GCAAAATGCC GCAAAAAAGG GAATAAGGGC GACACGGAAA
5751 TGTTGAATAC TCATACTCTT CTTTTTCAA TATTATTGAA GCATTATCA
5801 GGGTTATTGT CTCATGAGCG GATACATATT TGAATGTATT TAGAAAAAATA
5851 AACAAATAGG GGTCGCCGC ACATTTCCC GAAAAGTGC ACCTGACGTC
5901 GAATATCATT GAGAACGCTGC ATTTTTTTTT TTTTTTTTTT TTTTTTTTTT
5951 TATATATATT TCAAGGATAT ACCATTGTA TGTCGCCCC TAAGAAGATC
6001 GTCGTTTGCA CAGGTGACCA CGTGGTCAA GAAATCACAG CCGAAGCCAT
6051 TAAGGTTCTT AAAGCTATTCT CGATGTTCG TTCAATGTC AAGTTCGATT
6101 TCGAAAATCA TTTAATTGGT GGTGCTGCTA TCGATGCTAC AGGTGTTCCA
6151 CTTCCAGATG AGGCGCTGGGA AGCCTCCAAG AAGGCTGATG CCGTTTGTT
6201 AGGTGCTGTG GGTGGTCTTA AATGGGGTAC CGGTAGTGT AGACCTGAAC
6251 AAGGTTTACT AAAAATCCGT AAAGAACTTC AATTGTACGC CAACTTAAGA
6301 CCATGTAAC TGCATCCGA CTCTTTTA GACTTATCTC CAATCAAGCC
6351 ACAATTGCT AAAGGTAACG ACTTCGTTGT TGTCAGAGAA TTAGTGGAG
6401 GTATTTACTT TGGTAAGAGA AAGGAAGACG ATGGTGATGG TGTCGTTGG
6451 GATAGTGAAC AATACACCGT TCCAGAAGTG CAAAGAATCA CAAGAATGGC
6501 CGCTTTCATG GCCCTACAAC ATGAGCCACC ATTGCCTATT TGGCCTTGG
6551 ATAAAGCTAA TGTTTGGCC TCTCAAGAT TATGGAGAAA AACTGTGGAG
6601 GAAACCATCA AGAACGAATT CCCTACATTG AAGGTTCAAC ATCAATTGAT
6651 TGATTCTGCC GCCATGATCC TAGTTAAGAA CCCAACCCAC CTAAATGGTA
6701 TTATAATCAC CAGCAACATG TTGGTGATA TCATCTCCGA TGAAGCCTCC
6751 GTTATCCCAAG GTTCCCTGGG TTGGTTGCCA TCTGGTCT TGGCCTCTT
6801 GCCAGACAAG AACACCCGAT TTGGTTGTG CGAACCATGC CACGGTTCTG
6851 CTCCAGATTG GCCAAAGAAT AAGGTCAACC CTATGCCAC TATCTGTCT
6901 GCTGAATGA TGTTGAAATT GTCAATTGAC TTGCGTGAAG AAGGTAAGGC
6951 CATTGAAGAT GCAGTTAAA AGGTTTGGA TGCGAGTATC AGAACTGGTG
7001 ATTTAGGTGG TTCCAACAGT ACCACCGAAG TCGGTGATGC TGTCGCCGAA
7051 GAAGTTAAGA AAATCCTTGC TTAAAAAGAT TCTCTTTTT TATGATATT
7101 GTACAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA AAAAAAAA
7151 AAAATGCAGC GTCACATCGG ATAATAATGA CGTCTAAGAA ACCATTATTA
7201 TCATGACATT AACCTATAAA AATAGGCGTA TCACGAGGCC CTTTCGTCTC
7251 GCGCGTTTCG GTGATGACGG TGAAAACCTC TGACACATGC AGCTCCCGGA
7301 GACGGTCACA GCTTGTCTGT AAGCGGATGC CGGGAGCAGA CAAGCCCGTC
7351 AGGGCGCGTC AGCGGGTGTGTT GGCGGGTGTGTC GGGGCTGGCT TAACTATGCG
7401 GCATCAGAGC AGATTGACT GAGAGTGCAC CATATGGACA TATTGTCGTT
7451 AGAACGCGGC TACAATTAAT ACATAACCTT ATGTATCATA CACATACGAT
7501 TTAGGTGACA CTATA

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Fig:42 pGenIn022A - 12093 bp

1 GAACGCGGCC GCCAGCTGAA GCTTCGTACG CTGCAGGTG AC GGATCAAA
51 ATTGTGACAG CTTTCCAGAA TG GATTATTT TT CCTCAAAT TC CTTGTCTT
101 CCTGTTTCA TCTGGACCAT CTCCATAATG AAGCCTAAC TGTTTGGCAC
151 GTAGCGAAC GTGATCGTCA CAAACCGTAA GGTAGAGACC CCAGATTTTC
201 GCATTTCTC TTAAACTCTC CATTAGCTTA GGATCTGACG ATCACCTAGC
251 GACTCTCTCC ACCGTTGAC GAGGCCATT AAAAAAACAT AACGAACGAC
301 AAGCCTACTC GAATTCTGTT CAAACTCTT TT CGAACTTG TCTTCAACTG
351 CTTTCGATG AAGTACCTCC CAACTACTTT TCCTCACACT TGTACTCCAT
401 GACTAAACCC CCCCTCCAT TACAAACTAA AATCTTACTT TTATTTCTT
451 TTGCCCTCTC TGTCGCTCTG CCTTAACTAC GTATTTCTCG CCGAGAAAAA
501 CTTCAATTAA AGCTATTCTC CAAAAATCTT AGCGTATATT TTTTTTCAA
551 AGTGACAGGT GCCCCGGTA ACCAGTTCC TCACTATTT TTACTGCGGA
601 AGCGGAAGCG GAAAATACGG AAACGCGCGG AACATACAA AACATACAAA
651 ATATACCTTT CTCACACAAG AAATATATGC TACTTGCAAA ATATCATAACC
701 AAAAAAACTTT TCACAAACCGA AACCAAAAC AACGGATATC ATACATTACA
751 CTACCAACCAT TCAAAACTTTA CTACTATCTT CCCTTCAGTT TCCCTTTTC
801 TGCCCTTTTC GGTGACCGAA ATACGCTTC GAGACCTAA AGGAAATCC
851 ATGCCATAAC AGGAAAGTAA CATCCCAATG CGGACTATAC CACCCACCA
901 CACTCCTACC AATAACCGTA ACTATTCTAT GTTTCTTAC TCCTATGTCT
951 ATTCACTTTT CATCTGACTA CCTAATACTA TGCAAAATG TAAAATCATC
1001 ACACAAACCA TAAACATCA AAATCAGCCA TTCCCGCACC TTTCCCTCTG
1051 TCCACTTTCA ACCGTCCTC CAAATGTAAA ATGGCCTATC GGAATACATT
1101 TTCTCATCTC TAACTACTAT AAAACAACCT TTAGACTTAC GTTTGCTACT
1151 CTCATGGTCT CAATACTGCC GCGCACATT TGTCACCAT ACTAAATCTC
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1351 GCCACCTACC GACCAACTTT CATGTTCTGT TTGACCTAC CTCTTGTAAA
1401 TGACAAATCA CCTTTTCACT CGTATGCACC TTATTCTCCA CATCACAATG
1451 CACTATTGCT TTTGCTTTT CACCTGTCA TCCATTGC TATTAGATGA
1501 AATATAATAA AAATTGCTCT CCACCCATAA CACCTCTCAC TCCCACCTAC
1551 TGAACATGTC TGGACCCCTGC CCTCATATCA CCTGCGTTT CGTTAAACTA
1601 TCGGTTGCGG CCATATCTAC CAGAAAGCAC CGTTCCCGT CCGATCAACT
1651 GTAGTTAACG TGGTAAGAGC CTGACCGAGT AGTGTAGTGG GTGACCATAC
1701 GCGAAACTCA GGTGCTGCA TCTTTATTTC TTTTTTTTT TTTTTTTTT
1751 TTTTTTTTTC TAGTTCTTG GCTCCTATG CTAAATCCCA TAACTAACCT
1801 ACCATTGAT TCAGAAAAAT TCGCACTATC CAGCTGCACT CTTCTCTGA
1851 AGAGTTAACG ACTCCATTAT GCTCATTGGG TTGCTACTAC TTGATATGTA
1901 CAAACAAATAT TCTCCCTCGA TATTCTACA AAAAAAAA AAAAAACACT
1951 CCGGTTTTGT TCTCTTCCCT CCATTTCCCT CTCTCTACG GTTAATACTT
2001 TCCCTCTCGT CTTTTCTAC ACCCTCGTT AGTTGCTT TATTCTTCC
2051 CGCTTCTCGT CACTAACATT TTGCCGATT ACATATATG ATCGTAGTAC
2101 ATCTTACAAC TCCGCATACC GCGTCGCCGC GTGCCGGT CGCCAAAAT
2151 TTACTTCGCC ACCATCCA TATCTGTTAA GTATACATGT ATATATTGCA
2201 CTGGCTATTC ATCTTGCACT TTCTCTCTT CTTCTTCCCA GTAGCCTCAT
2251 CCTTTTACGC TGCCCTCTG GAACTTGCCA TCATCATTCC CTAGAAACTG
2301 CCATTTACTT AAAAAAAA AAAAAAAA AATGCCCCA CTGTTCACTG
2351 TTCACTGTTT ACCTGCTCT TACATCTTC TTGGTAAAT CGTAGTTCGT
2401 AGTATTTTTT TTCAATCAA AGGCATGTCC TGTTAACTAT AGGAAATGAG
2451 CTTTCTCAA TTCTCTAAAC TTATACAAGC ACCTCATGTT TGCCGCTCTG

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2501 ATGGTGGGAA AAAAAGTGTGCT CCATGAAGCA AACTGTCCGG GCAAATCCTT
2551 TCACGCTCGG GAAGCTTGT GAAAGCCCTT CTCTTCAAC CCATCTTGC
2601 AACGAAAAAA AAAAAAAA TAAAAAATAA AAAGACAAA TAGTAAATAG
2651 TAACCTACAT ACATTAGTAA ATGGTACACT CTTACACACT ATCATCCTCA
2701 TCGTATATTA TAATAGATAT ATACAATACA TGTTTTACCG CGGATCATAG
2751 AATTCTTAAG ACAAAATAAA TTTATAGAGA CTTGTTCAAGT CTACTTCTCT
2801 CTAAACTAGG CCCCGGCTCC TGCCAGTACCC CACTTAGAAA GAAATAAAA
2851 ACAAAATCAGA CAACAAAGGC TTATCTCG CAGATCGTAA CAACAAGGCT
2901 ACTCTACTGC TTACAATACC CGGTGTCACA TCTAAGTCGT ATACAAATGA
2951 TTTATCCCCA CGCAAAATGA CATTGCAATT CGCCAGCAAG CACCCAAGGC
3001 CTTTCCGCCA AGTGCACCGT TGCTAGCCTG CTATGGTCA GCGACGCCAC
3051 AAGGACGCCCT TATTGCTATC CATCTATATT GTGTGGAGCA AAGAAATCAC
3101 CGCGTTCTAG CATGGATTCT GACTTAGAGG CGTTAGCCA TAATCCAGCG
3151 GATGGTAGCT TCGCGGCAAT GCCTGATCAG CAAGCGCAA AAACCAATTAA
3201 TCCGAATGAA CTGTTCTCT CGTACTAAGT TCAATTACTA TTGCGGTAAC
3251 ATTCACTAGT AGGGTAAAC TAACTGTCT CACGACGGTC TAAACCCAGC
3301 TCACGTTCCC TATTAGTGGG TGAAACAATCC AACGCTTACCC GAATTCTGCT
3351 TCGGTATGAT AGGAAGAGCC GACATCGAAG AATCAAAAAG CAATGTCGCT
3401 ATGAAACGTT GACTGCCACA AGCCAGTTAT CCCTGTGGTA ACTTTCTGG
3451 CACCTCTAGC CTAAATTCC GAGGGACTAA AGGATCGATA GGCCACACTT
3501 TCATGGTTTG TATTCAACT GAAAATCAAATCAAGGGGG CTTTACCCCT
3551 TTTGTTCTAC TGGAGATTTC TGTTCTCCAT GAGCCCCCT TAGGACATCT
3601 GCGTTATCGT TAAACAGATG TGCCGCCCA GCCAAACTCC CCACCTGACA
3651 ATGTTCTCAA CCCGGATCAG CCCGAATGG GACCTTGAAT GCTAGAACGT
3701 GGAAAATGAA TTCCAGCTCC GCTTCATTGA ATAAGTAAAG AAACTATAAA
3751 GGTAGTGGTA TTTCACTGGC GCCGAAGCTC CCACTTATTC TACACCTCT
3801 ATGTTCTTC ACAATGTCAA ACTAGAGTCA AGCTCAACAG GGTCTTCTTT
3851 CCCCGCTGAT TCTGCCAAGC CCGTCCCTT GGCTGTGGTT TCGCTAGATA
3901 GTAGATAGGG ACAGTGGAA TCTCGTTAAT CCATTCACTGC GCGTCACTAA
3951 TTAGATGACG AGGCATTGG CTACCTTAAG AGAGTCATAG TTACTCCCGC
4001 CGTTTACCCCG CGCTTGGTTG AATTCTTCAT CTTTGACATT CAGAGCACTG
4051 GGCAGAAATC ACATTGCGTC AACATCACTT TCTGACCATC GCAATGCTAT
4101 GTTTTAATTA GACAGTCAGA TTCCCTTGT CGCTTACCAAGT TCTAAGTTGA
4151 TCGTTTAATTG TAGCAAGCGA CGGTCTACAA GAGACCTACC AAGGCCGTCT
4201 ACAACAAAGGC ACGCAAGTAG TCCGCCCTAGC AGAGCAAGCC CCACCAAGCA
4251 GTCCACAAGC ACGCCCGCTG CGTCTGACCA AGGCCCTCAC TACCCGACCC
4301 TTAGAGCCAA TCCCTATCCC GAAGTTACGG ATCTATTTCG CCGACTTCCC
4351 TTATCTACAT TATTCTATCA ACTAGAGGCT GTTCACCTTG GAGACCTGCT
4401 GCGGTTATCA GTACGACCTG GCATGAAAAC TATTCTTCC TGTGGATTTT
4451 CACGGGGCGCT CACAAGCGCA CCGGAGCCAG CAAAGGTGCT GGCCTTCTCC
4501 AGCCATAAGA CCCCATCTCC GGATAAAACCA ATTCCGGGGT GATAAGCTGT
4551 TAAGAAGAAA AGATAACTCC TCCCGGGCT CGCGCCGACG TCTCCACATT
4601 CAGTTACGTT ACCGTGAAGA ATCCATATCC AGGTTCCGGA ATCTTAACCG
4651 GATTCCCTTT CGATGGTGGC CTGCATAAAA TCAGGCCTTT GAAACGGAGC
4701 TTCCCCATCT CTTAGGATCG ACTAACCCAC GTCCAACCTGC TGTTGACGTG
4751 GAACCTTCC CCACTTCAGT CTTCAAAGTT CTCATTTGAA TATTGCTAC
4801 TACCAACAG ATCCAAGCTA TCTACTGAGA TTTCTGGCTC TTTTGTGTA
4851 CTGTCACCTA ACCACAGACCC AACCATCCAA GCCATACCTT TTACAGCAGG
4901 AGTTACAAGG TCACTACGTC CAGTGAGAAA TTTAGATAAA ACACCATTT
4951 CTGCGACTAC TGGACCAAAT CTTATGCAGC TAGAAATTCT CAATTGAGCA
5001 TCAAGATAAT CCAAATCTCT AACTTCAATG TCAAAGTTGA AATATTCTCC
5051 TTTAGAGCCGC TCCATTCTT CTATGAAGCG TTTTGCAGCA AACTCACCTT
5101 CAACTGTCA TGGGAATGTC TTATGATGGT TTTTGGAAAT TATTATTATC

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5151 CTACCATCAA GCGTCTGACA TTGCTGCAGA TTTCTCCATC TCACCTTATA
5201 TTTGGTGGCA TTTCTACCA CTTTTTCCAA CAGTGGTTG GTAGGGACCC
5251 TGACTGACAA TTTATGACCT GCAGTACATT GTAATGCAAG ACGCTGATAA
5301 ACTGTTCTAC GCCTGGGATC TAACCTACCA GGTTCACCTT CAAAAGCTCT
5351 GTGTTGGTT TTTGCTGTA TATTATAGAT TTTCTGATAG CCCTGTGTGA
5401 CATTATGAC GCGGGCAGCG GAGCCATCTG CGCACATAAC GTAAGAGTTA
5451 GCCGTGACGT TTGCGATGTC TTTAATTCA CCGTTAGCCA TCAGAATAGT
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5551 AGATTATGTG TTGCACTTT ATAGACCTAC CAAAATCCA GTGCGTACAC
5601 TAATACTTTC ATAAAGATAC CTGAAACAAT AACCGAGAAAG ATCGGCAAAA
5651 AAATTTTTT TCTTTGCCGA GATCACAAAC CTACTATGAC GAAAAGCTT
5701 GAAGTTTAGA TGAGTAAGGA AAATACAAGT GACGTTTTA TATGGTGCAA
5751 GGAACAAAAA CTAAAAACAA CAAGGCAAAT GTGGATCTGT CATGTATGGC
5801 AACGACAGCA GGATGGCTCA CAAAAAAAGA CAAAAAAAC TAAGGCAAAA
5851 GAACAAAGCT CCTCTCTGC TCAAGAAACG TATTGTTGAA AAACCACCGT
5901 CGTAAGAAAG TTTTCTGTG ACCTATAATG GTTAAAATC GGCCCATT
5951 TTTCCCTCT TTTGCGTCC AGCTTTCTC ATACTCGAGG GAAATTGAC
6001 ACAAACAGCG GAGAAGTGTG GCTAAACCGG CAAGTGCCTG CAAGATCCAC
6051 AGAACTAACG GCACGAACGT GCGGTAGAA AAGAGCCTGT TCCGGAAAGA
6101 GAGAACAGA GAAACGATCA TGATGGGAAA GCGGGGATTC GGCGAAGAAC
6151 GAGACTGGAA AGGGAAAAAG AGAAAATACTG GTGGAAGTAT TCGGACCTT
6201 GGCAGAAGTCC GAACCCCTGA AACCCAAAGA TGATCGATGA TTCATTTTC
6251 AATGCGCTAC GGTTCTGCG GCTCGTGGGA ACCCCACGCA AAACATATTA
6301 TTGCTTCTC TCTGCTGACA ACTCCGGTT ACGTTATACC GTATTAGGAT
6351 CACTATAAGG GTTCCCTCGG GAGGAGGGGG GAGGGGAAGA ATGTACATCG
6401 TCATAAGGCC TTTATGGTGT GAAGTGGGTT TTGCGTGGAA AATTGTTT
6451 CAATGATATA GAGCCCACGC ATATACGTAC ATACTAGTGG CAAAAGCGT
6501 GGGGTGGGGC GACAAAGCTA CACTGGTAA ATACAGGATT CTATGAACAA
6551 TAACAACAAAC CAGCTCACGT TGCTGAACAG CCGAGGTCAG CCGATGCAAC
6601 CGAGGTTTCC AAAGTAGCAT TTCTGCTA GCTATGCTG TAGGTTTACA
6651 TTTAATGGTG CGTGGTCCA GCTTCATGTG CTTGCATGTG ATGTCCTGCA
6701 GATGGTAAGA AGATTCTGAA AGCCCGCCTA GGAGAAAAAT ATTCTGCTCG
6751 AAGATCTGTC CTCTTAAGTA GAAAGCGTGA AATTGTTGCG TTCTGCTT
6801 ACTACTCAAC GCGTACGAA ATGCGTCTAC TGACCTGCA TGATAAAGCT
6851 TATGTATCAA AAATTTAACAA TCTTGAAAT ACACAAGTGG TGCAAAGATG
6901 TGTCACGTTG TGGACCTGAG TGGTGCCTG TATGCTATT AACATGCAA
6951 GGGGAAGACCTT CTTCCGGCTT ACTGCAATAA TAAAAAGTAT TTACCGTT
7001 ACCCAATATA GCAAAGTTT GCGCAAAAAA AAAAATAAAA ACAATTACA
7051 ACAAAAGA AAAAAAGA AATAATAGAA GATCTAACTG AAGCGAAGGC
7101 CAAACTCTT CTCACTTGAC GAAATAGCCG ATACAAAATC TAGAGCAGCA
7151 ACTTTTCTCT TTCTTCACTA AAGCTGCTAC GAAAGTATAG AAAAATCAAA
7201 CGCTCAGAAC TTAGCTCTAT TTCAAGGTAC CATATATATT TCCTTATAAC
7251 TGATGTTAAT TAACTCTAA GGTGAAGAAT TATTCACTGG TGTTGTCCC
7301 ATTTGGTTG AATTAGATGG TGATGTTAAT GGTACAAAT TTTCTGCTC
7351 CGGTGAAGGT GAAGGTGATG CTACTTACGG TAAATTGACC TTAAAATT
7401 TTTGTACTAC TGGTAAATTG CCAGTCCAT GGCAACCTT AGTCACTACT
7451 TTGCGTTATG GTGTTCAATG TTTGCGAGA TACCCAGATC ATATGAAACA
7501 ACATGACTTT TTCAAGTCTG CCATGCCAGA AGGTTATGTT CAAGAAAGAA
7551 CTATTTTTT CAAAGATGAC GGTAACTACA AGACCGAGGC TGAAGTCAAG
7601 TTTGAAGGTG ATACCTTAGT TAATAGAATC GAATTAAAAG GTATTGATT
7651 TAAAGAAGAT GGTAAACATT TAGGTACCAA ATTGGAATAC AACTATAACT
7701 CTCACAATGT TTACATCATG GCTGACAAAC AAAAGAATGG TATCAAAGTT
7751 AACTTCAAAA TTAGACACAA CATTGAAGAT GGTTCTGTC AATTAGCTGA
7801 CCATTATCAA CAAAATACTC CAATTGGTGA TGGTCCAGTC TTGTTACCAG

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7851 ACAACCATTA CTTATCCACT CAATCTGCCT TATCCAAAGA TCCAAACGAA
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9051 CACGACTTAT CGCCACTGGC AGCAGCCACT GGTAAACAGGA TTAGCAGAGC
9101 GAGGTATGTA GGCGGTGTCA CAGAGTTCTT GAAGTGGTGG CCTAACTACG
9151 GCTACACTAG AAGGACAGTA TTTGGTATCT GCGCTCTGCT GAAGCCAGTT
9201 ACCTTCGGAA AAAGAGTTGG TAGCTCTTGA TCCGGCAAAC AAACCAACCGC
9251 TGGTAGCGGT GGTTTTTTTG TTTGCAAGCA GCAGATTACG CGCAGAAAAAA
9301 AAGGATCTCA AGAAGATCCT TTGATCTTTT CTACGGGGTC TGACGCTCAG
9351 TGGAACGAAACTCAGTTA AGGGATTTTG GTCATGAGAT TATCAAAAG
9401 GATCTTCACC TAGATCTTT TAAATTTAA ATGAAGTTT AAATCAATCT
9451 AAAGTATATA TGAGTAAACT TGGTCTGACA GTTACCAATG CTTAATCAGT
9501 GAGGCACCTA TCTCAGCGAT CTGCTATTCT CGTTCATCCA TAGTTGCCTG
9551 ACTCCCCGTC GTGTAGATAA CTACGATACG GGAGGGCTTA CCATCTGCC
9601 CCAGTGCCTGC AATGATACCG CGAGACCCAC GCTCACCGGC TCCAGATTAA
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10301 AAAAAAGGGA ATAAGGGCGA CACGGAAATG TTGAATACTC ATACTCTTCC
10351 TTTTCAATA TTATTGAAGC ATTATCAGG GTTATTGTC CATGAGCGGA
10401 TACATATTTG AATGTATTAA GAAAAATAAA CAAATAGGGG TTCCGCGCAC

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10451 ATTTCCCCGA AAAGTCCAC CTGACGTCGA ATATCATTGA GAAGCTGCAT
10501 TTTTTTTTTT TTTTTTTTTT TTTTTTTTTA TATATATTTC AAGGATATAC
10551 CATTGTAATG TCTGCCCTA AGAAGATCGT CGTTTGCCA GGTGACCACG
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